



HYPERINSULINEMIA AND ITS ASSOCIATION WITH POLY CYSTIC OVARIAN SYNDROME

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ABSTRACT... Objective: To determine the variable clinical presentation of Poly cystic ovarian Syndrome (PCOS) & its association with Hyperinsulinaemia in young adolescent girls. **Patients & Methods:** A descriptive study was conducted for one year from February 2009-2010 at Isra University Hospital Hyderabad (IUH). 136 adolescent girls who came in OPD with suspected features of polycystic ovarian syndrome were recruited. Biochemical test, ultrasound of pelvis and test to determine hyperinsulinemia were done .woman having preexisting ovarian pathology were excluded. All results were analyzed on statistical software SPSS version 16. Frequencies and percentages were calculated. **Result:** Insulin resistance significantly increased (43.4 %) in girls who have shown the features of PCOS. Weight gain observed in 69 (50.7 % - Obese) and 40(29.4%- very obese) of girls respectively. Different types of menstrual irregularities such as oligomenorrhea 50(36.8%), secondary amenorrhea 28 (20.6%) primary amenorrhea 5 (3.7%) were observed. 53(39.0%) adolescent girls had normal cycle but evidence of PCO on ultrasound. Infertility was found in 32 (23.5%) of participant followed by hirsutism& acne in 59 (43.4%) 45 (33.1%) of woman respectively. **Conclusions:** There is significant association of PCOS with hyperinsulinemia. Hyperinsulinemia if persist can lead to metabolic syndrome with its serious sequelae .Steps should be taken for early recognition of PCOS in young woman.

Key words: PCOS, Obesity, Adolescent, Menstrual irregularities, Hyperinsulinemia.

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is the commonest endocrine disorder in women¹ with multiple etiologies and variable clinical presentation^{2,3,4}. It can be manifested with high serum levels of androgens and insulin, hyperlipidemia, overweight, infertility, hirsutism, and acne⁵ it is also associated with a characteristic ovarian appearance on ultrasound scan. PCOS is stated that hyperandrogenaemia is primary, with insulin resistance a secondary consequence that mainly related to reduced insulin sensitivity in peripheral tissues, leading to hyperinsulinaemia, increase abdominal fat depots and modified skeletal muscle structure^{6,7,8}. Prevalence of PCOS in general population is about 3–7%. In Pakistan it rises up to 20.7% where it is associated with infertility in 6- 8%⁹. It is associated with obesity in 60% of women. It also increases the risk of diabetes and cardiovascular disease in 10 % and 33 % of women respectively. Adolescents with PCOS have a 30–60% prevalence of metabolic

syndrome¹⁰. Polycystic ovary syndrome (PCOS) causes a wide range of problems that can have impact on health-related quality of life (HRQoL), emotional well-being and sexual satisfaction of women¹¹. PCOS has a greater impact on women's psychological well-being when compared with chronic problems such as asthma, epilepsy, diabetes, backache, arthritis and coronary heart disease¹². Some researchers also pointed out that adolescent with PCOS scored lower on subscales measuring general health perceptions, physical functioning, general behavior, and limitations in family activities because of illness.

MATERIALS & METHODS

Operational Definitions

Adolescents

WHO defines “adolescents” as individuals in the 10-19 years age. Adolescence (lat adolescere, (to) grow) is a transitional stage of physical and mental human development that occurs between childhood and adulthood.

Hirsutism: Hirsutism was defined by a modified Ferriman Gallwey score > 6 and is characterized by excessive and increased hair growth on female humans in locations where the occurrence of terminal hair is normally absent or minimal.

Secondary Amenorrhea is defined as cessation of menstruation for more than six month in reproductive age group and was not due to pregnancy.

Oligomenorrhea, Oligomenorrhea means menses at interval of more than 35 days .

BMI. As recommended by U. S preventive services task force (USPSTF).

Body mass index (BMI) is a measure of body fat based on height and weight.

Normal built 19 -25 kg /m²

Overweight 26 - 30 kg / m²

Obese 31 - 40 kg /m²

Very obese > 40 kg / m²

Infertility was described as inability of a couple to conceive within one year.

Poly cystic ovarian morphology on ultrasound.

Polycystic ovaries were defined as enlarged ovaries with 8-10 follicles of 2-8 mm in diameter arranged on the periphery of ovaries and increased stromal thickness.

DATA COLLECTION PROCEDURE

All the adolescent girls who has came with oligomenorrhea, Amenorrhea (Primary& Secondary) Hirsutism, obesity were further explored by asking specific questions like menarche, cycle regularity , duration, amount of bleeding , Acne , Hirsutism , weight gain, inability to conceive. Young girls with normal menstrual cycle with evidence of poly cystic ovaries on ultrasound. Family history of PCOS & Diabetes in first degree relatives were included, however woman with preexisting pelvic pathology endocrine disorders were excluded. After that thorough examination including height in meter & weight in Kilogram were done . Women were

advised for biochemical tests including FSH and LH ratio and Ultrasound pelvis. Woman who were fulfilling the criteria was advised for 12 hour fast and fasting serum insulin level were checked by draining 2 cc of venous blood, To standardized the test it was carried out from single laboratory. Hyperinsulinemia was considered when level is more than 17 U micro μ / ml.

RESULT

Table I depicts the demographic features of study participants' .The mean + SD age is found to be 18.21 + 22 years; whereas the median, mode and range were 18. 20 & 15 years respectively. While elaborating the effects of menstrual irregularities having features of PCOS & hyperinsulinemia 50 (36.8%) adolescent girls gave the history of oligomenorrhea , while 53 (39.0%) had normal cycle but evidence of poly cystic ovaries (PCO) on ultrasound. 28 (20.6%) had Secondary Amenorrhea and 5 (3.7%) were primary Amenorrhea. Infertility was found in 32(23.5%) of girls. Weight gain was the commonest presenting complain found in 69 adult girls after calculating their BMI. 29 (21.3%) girls were found to be obese and 40 (29.4 %) were very obese , while 67 (49.3%) had normal BMI .81 (59.6%) had positive family history of diabetes in first degree relative shown in Table I.

Sign of Hyperandrogenism including Hirsutism& acne were seen in 59 (43.4%) and 45 (33.1%) of girls respectively however reverse LH / FSH ratio were found in 39 % of woman shown in table II. Fasting serum insulin level were normal in 77 (56.6%) while 59 (43.4%) girls had level above17 micro U / ml indicating hyperinsulinemia shown Table-III.

DISCUSSION

Insulin resistance defined as decrease biological response to a given amount of insulin¹². Now a day's most attention is focused on the role of insulin resistance and hyperinsulinemia in the development of the PCOS and it is more pronounced in adolescent. Present studies showed adolescent ages between 11-20 years. Presences of menstrual irregularities are must for the diagnosis of PCOS. Menstrual irregularities

Variables	No. of Subjects	%age
Normal cycle (evidence of PCO on ultrasound)	53	(39.0%)
Oligomenorrhea	50	(36.8%)
Secondary Amenorrhea	28	(20.6%)
Primary Amenorrhea	05	(3.7%)
Anovulation / Infertility	32	(23.5%)
Woman having normal BMI	67	(49.3%)
Obese	40	(29.30%)
Positive family history of diabetes in first degree relatives	81	(59.6%)

Table-I. Showing the menstrual irregularities in young girls with PCOS:

Variables	Number (n=)	%age
Sign of hyperandrogenism	59	43.4%
Acne	45	33.1%
Reverse FSH and LH	54	39%

Table-II. Showing the features of androgenization in adolescent girls with PCOS: (n = 136).

Insulin Level	Number of patients	Percentages (%)
3-10 micro U/ml	57	41.9%
>10-14 micro U/ml	13	9.5%
>14-16 micro U/ml	09	6.61%
>17 micro U/ml	59	43.4%

Table-III. Indicating Serum Insulin Level of adolescent girls diagnosed as having Polycystic ovarian syndrome (n = 136)

have hallmarks association with PCOS. In study conducted by Stein and Leventhal amenorrhea was the presenting complain¹. However in other study of 1741 with PCOS 30% of woman had regular menses and 66% had amenorrhea and Oligomenorrhea respectively². Present study showed normal cycle with features of PCOS in 39 % oligomenorrhea in 36% and association of primary & secondary amenorrhea in 20 % and 3% of woman respectively. Similarly Rasool et al also find an association with hirsutism & oligomenorrhea with polycystic ovaries in 57.7% of woman³. Obesity, particularly the abdominal phenotype, may be partly responsible for insulin

resistance in women with PCOS¹³. Therefore, obesity-related hyperinsulinaemia may play a key role in favoring hyperandrogenism in these women¹⁴. 19 Present Study showed that 69 girls gave history of weight gain after calculating their BMI. 67 (49.3%) had normal BMI while 29(21.31%) were found to be obese. While comparing the result of obesity related to PCOS present study found similar association with that of Tan`s study¹⁴. The incidence of infertility with PCO in this study is 24%. Which is just similar to another study by Irshad (25%) & Baqai (49.9%) respectively¹⁵. Acne and Hirsutism are found in 45% and 43.4% of girls respectively. According to study by Adil F¹⁶, Hirsutism and Acne were also seen in 62.49% of woman respectively. According to Zhang et al there is a strong correlation of women with hyperinsulinemia and first degree relatives with diabetes¹⁷. Similarly in present study 81 (59.6%) with PCOS had a positive family history of diabetes. On Trans abdominal Ultrasound evidence of PCOS was found in 22(16.18%) of adolescent girls. Similarly Kashif¹⁸ et al reported that 93% of PCOS were diagnosed on ultrasound however the sample size is more as compare to present study and most of the ultrasound were performed by transvaginal route. Hyperinsulinaemia can be a primarily pathology in young PCO adolescent girls responsible for metabolic syndrome. In present study 43 .4 % of adolescent girls had hyperinsulinemia which indicate significant insulin resistance .Every adolescent girls who fulfill the criteria of PCOS must undergo checking for fasting serum insulin levels. This strategy should be familiar to every young doctors and family physician so that early detection and intervention can be made soon.

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CONCLUSIONS

Hyperinsulinemia is an emerging health problem with significant association with metabolic syndrome including PCOS.

General Practitioners and family physician should be aware to think about this common disorder in adolescent age group for early diagnosis and further prevention of complications of metabolic syndrome associated with PCOS.

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