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Free Androgen Status between Oligomenorrheic and Eumenorrheic Adolescence Girls- It's Comparison.

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ABSTRACT

Polycystic ovarian syndrome is a common endocrine disorder characterized by hyperandrogenism and hyperinsulinemia with irregular cycles. In the first five years after menarche cycles are irregular which are physiological importance and no reason for clinical or endocrine evaluation. The purpose of this study is to evaluate the status of androgen level in adolescent girls with irregular cycles within the first eight years after menarche. The subjects in this study include two groups with the age between 17-19 years. Group 1 includes adolescent girls with regular cycles. Group 2 includes adolescent girls with irregular cycles. For both groups BMI was measured and the androgen status was assessed by measuring hormones like testosterone and sex hormone binding globulin (SHBG). Student t- test was performed to analyze the significance of mean values between the two groups and it was found the P- values of testosterone, SHBG and FAI were statistically significant between the two groups. This study suggests that the increased status of free androgen index in oligomenorrheic adolescence girls which proceed towards the aetiogenesis of PCOS in later adulthood life.
Keywords: androgen, oligomenorrheic, eumenorrheic, adolescence.

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INTRODUCTION

Oligomenorrhoea which is common in adolescent girls is defined as cycles less than nine menstrual periods per year. Various studies studied on variation in the length of the menstrual cycle concludes that irregular menstrual cycles in the first five years after menarche are physiological and no reason for clinical or endocrine evaluation [1]. However about most of the adolescent girls with oligomenorrhoea remained oligomenorrhoeic during a follow up of eight years [2]. Adolescent girls with irregular cycles particularly oligomenorrhoea have high LH and androgen levels and polycystic ovaries at ultrasound evaluation [3-5].

The testosterone levels are lower in females than males and its role as follicular regulator is well established. Testosterone of ovarian origin is secreted by the theca interstitial compartment which stimulates the secretion of FSH, Insulin like growth factor (IGF-I) resulting in granulosa cell aromatase, an enzyme that catalyses the conversion of testosterone to estradiol. The interaction between hypothalamic – pituitary axis with thecal and granulosa cell compartments results in the selection of a dominant follicle. The testosterone is present in the peripheral circulation in three forms as free form, weekly bound to albumin and tightly binds to sex hormone binding globulin (SHBG). The androgen status can be measured by calculating the ratio of total testosterone to the concentration of SHBG and the ratio is called free androgen index (FAI) which is a useful indicator of an abnormal androgen status. The FAI is increased in severe acne, male androgenic alopecia like baldness and in hirsutism.

Due to rise in overweight among adolescent girls, it is important to investigate the status of androgenism and their effect on its reproductive health, to quantify the strength of its association with menstrual irregularity. Clinical studies have established that if the testosterone level is increased the SHBG level will decrease and suggest the role of ovarian dysfunction with menstrual irregularity in PCOS subjects. The purpose of this study is to examine the status of androgen status in eumenorrheic and oligimenorrheic adolescence girls towards the end of hypothalamic hypophyseal maturation that is 5-8years after menarche.

MATERIALS AND METHOD

The subjects in this study include adolescent girls between 17-19 years. After obtaining the institutional ethical committee clearance and informed consent, they were divided into two groups. The group 1 includes regularly menstruating girls and group 2 includes irregularly menstruating girls. Menstrual cycle is defined regular when an average length of the cycle was between 22 and 41 days either none or a single cycle with length<22 and >41 days during the year. The menstrual cycle is defined irregular when the length of the cycle length was between 22 and 41 but with two or more cycles with a length <22 or >41 days during the year. After recording the general profile of the subjects like age weight, height and BMI for the both groups, 3 ml of intravenous blood was taken from each participant, centrifuged and the serum samples was separated and kept at -20^{0}c and hormones like FSH on day 3 , testosterone and SHBG were assessed and FAI was calculated.

The FSH levels were analyzed by MONOBIND INC. Testosterone and SHBG were measured using enzyme-linked immunoassay kit. The student t' test was performed between the two groups SPSS (social package for statistical sciences).

RESULTS

The mean value of age in adolescent girls with regular cycle was and in adolescent girls with oligomenorrhea were 19.2 and 19.5 years. The mean value of height, weight, BMI in adolescent girls with regular cycle was 152.4cm, 52.9kg, and 21.7kg/m2. The mean value of height, weight, and BMI in adolescent girls with irregular cycles was 155.9cm, 63kg, and 26.06kg/m2. The mean value of testosterone, SHBG and FAI in adolescent girls with regular cycle were 1.39nmol/l, 139.2nmol/l and 1.11%. The mean value of testosterone, SHBG and FAI in adolescent girls with irregular cycles were 2.13nmol/l, 79.3nmol/l and 3.4%. The variables whose mean showed a test of significance between regular and irregular cycled adolescent girls were testosterone (P=0.011) and FAI (p=0.002) and their P- value were shown in brackets.

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Table: Showing Test of Significance between the Variables in Two Groups

	Group 1	Group 2	P- Value
Age (years)	19.02±1.34	19.78±1.9	0.213
Height (cm)	152.4±2.29	155.9±3.5	0.170
Weight(kg)	52.9±9.9	63±7.07	0.154
BMI	21.7±3.6	26.06±2.82	0.365
Testosterone	1.39±0.89	2.13±1.83	0.011
SHBG	139.2±58.4	79.3±67.4	0.924
FAI	1.11±0.66	3.7±3.96	0.002

DISCUSSION

In this study of young adolescent girls, the finding suggests that there is an association between and menstrual irregularity with hormones like testosterone and SHBG, play an important role in pathogenesis of its irregularity. The FAI which is a measure of testosterone adjusted for SHBG also plays an important role in associating oligomenorrheic status in adolescent girls.

The testosterone level above 2.0nmol/l and free androgen index above 5.4 is clinically considered hyperandrogenism. The level of testosterone in girls with normal cycle was in the range 2-3nmol/l. But in this study the mean level of testosterone in non oligomenorrheic girls was 1.3 and in oligomenorrheic girls was 2.1. The testosterone level is very helpful in evaluation of hypogonadal states in males and hirsutism and **virusilism** in females. In females testosterone acts as follicular regulator. Sex hormone binding globulin is the major transport protein for testosterone. The reference value of SHBG is 18.4- 144n mol/l in normal cycling women, but in this study the mean value of SHBG was 139.2nmol/L in regularly menstruating girls and 79.3nmol/L in oligomenorrheic girls. The reference value of free androgen index in normal cycling women is 2-4.4%. In this study it was noticed that The FAI was 1.17 in regularly cycling girls and 3.7 in irregularly cycling girls. The FAI is often increased in acne, male androgenic alopecia, hirsutism and other conditions in which a normal total testosterone level is increased with a low in SHBG level.

Oligomenorrhea in the first few years after menarche is developmentally appropriate due to immaturation of hypothalamic pituitary ovarian (HPO) axis. 65% to 77% of adolescent girl's experience some anovulatory cycles in the first year following menarche and 35% of girls has anovulatory cycles by the fifth year following menarche [6-9]. Girls with later menarche have a longer period of ovulation than girls with earlier menarche. The irregular anovulatory cycles will convert to ovulatory cycles with regular menstrual periods within three years after menarche. Thus the adolescent girls with oligomenorrhoea, the ovulation become more prevalent and menses become more regular as the hypothalamo pituitary axis matures. If irregular cycles with oligomenorrhoea persist beyond three years following menarche the patient should undergo further evaluation which includes for androgenic test, which is responsible for the immaturity for HPO axis.

Adolescence should have two of the following three signs using Rotterdam criteria for the diagnosis of PCOS which include physical signs of hyperandrogenism or laboratory findings of hyperandrogenemia and polycystic ovaries on ultrasound. As many teens are virginal and cannot undergo a transvaginal ultrasound and is problematic as a criteria for adolescents. The most useful biochemical marker of PCOS in adolescents is an elevated free testosterone level and decreased SHBG level. In addition, multicystic ovaries are normal feature of early pubertal development in girls and can be confused with polycystic ovaries.

True androgen status can be assessed with the help of free testosterone or the ratio of the total testosterone concentration to the concentration of SHBG. This ratio which is called free androgen index which is elevated in non obese, non hirsute oligimenorrheic women is reported to be a sensitive and specific indicator for poly cystic ovarian diseases. The etiology is closely linked to obesity with adiposity and worsens the clinical presentation particularly menstrual irregularities and hyperandrogenism [10- 12].

CONCLUSION

This study suggests the increased status of androgenism in oligomenorrheic adolescence girls which proceed towards the aetiogenesis of PCOS in later adulthood life.

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REFERENCES

[1] Gardner J. Ann Hum Biol 1983; 10: 31- 40.
[2] Southam AL and Richard RM. Am J Obstet Gynecol 94: 637-645(1966).
[3] Van Hooff MH,Voorhorst FJ, Kaptein MB, Hirasing RA, Koppenaal C and Schoemaker J. Hum Reprod 1999b; 14: 2223-2229.
[4] Treloar AE, Boynton RE, Behn BG and Brown BE. Int J Fertil 1967; 12: 77-126.a
[5] Siegberg R, Nilsson CG, Stenman UH and Widholm O. Fertile Steril 1986; 46: 852-857.
[6] Flug D, Largo RH, Prader A. Ann Hum Biol 1984;11(6):495-508.
[7] Metcalf MG, Skidmore DS, Lowry GF, Mackenzie JA. J Endocrinal 1983;97(2):213-219.
[8] World Health Organization multicenter study on menstrual and ovulatory patterns in adolescent girls. II. Longitudinal study of menstrual patterns in the early postmenarcheal period, duration of bleeding episodes and menstrual cycles. World Health Organization Task Force on Adolescent Reproductive Health. J Adolesc Health Care 1986; 7(4):236-244.
[9] Bravender T, Emans SJ. Pediatr Clin North Am 1999;46(3):545-553.
[10] Holte J, Bergh T, Berne C, Wide L, Lithell H. J Clin Endocrinol Metab 1995;80:2586-2593.
[11] Barber TM, McCarthy MI, Wass JAH, Franks S. Clin Endocrinol . 2006; 65:137-145.
[12] Pas quail R, Gambineri A, Pagotto U. BJOG 2006; 113:1148.