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Original Research Article

Status of serum anti-mullerian hormone and lipid profile in polycystic ovarian syndrome: a cross-sectional study at tertiary care centre of central India

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ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) is the most common cause of chronic anovulation in young women and affects 5 to 10 % of the female population. Anti-Mullerian Hormone (AMH) level indicate the quantity of the ovarian follicle pool and may be a useful marker of ovarian reserves. In order to establish the pattern of change in serum AMH level and its contribution in alteration of lipid metabolism and PCOS related complications the present study was planned.
Methods: Study was carried out in M.G.M. medical college, Govt Holker College and K. R. G's Blessed mom centre from June -2016 to December -2017. The study population consisted total 50 women subjects among them 25 women suffering from PCOS aged between 18 to 35-year taken as case group and 25 age matched healthy women taken as control group. Fasting blood sample was collected from each subject and analyzed for AMH level and Lipid profile level.
Results: Results revealed that significantly increased serum AMH, cholesterol, triglycerides, LDL, VLDL levels and significantly decreased HDL levels were observed in PCOS cases when compare to control subjects.
Conclusions: Study concluded elevated AMH level leads to increase risk of polycystic ovarian syndrome and PCOS associated hyperlipidemia and other complications.

Keywords: AMH (Anti-mullerian hormone), Follicle stimulating hormone, Hyperlipidemia, PCOS (polycystic ovarian syndrome)

INTRODUCTION

Polycystic Overian Syndrome (PCOS) is one of the most common endocrine disorder in women of reproductive age, which is multi factorial in etiology. PCOS includes a heterogeneous collection of signs and symptoms which affect the reproductive, endocrine and metabolic functions.[1-3] Prevalence of PCOS is around 5 to 10 % of reproductive age female.[4] Anti-MullerianHormone (AMH), also known as Mullerian Inhibiting Substance (MIS), is a homodimeric glycoprotein.[5] The AMH belongs to the Transforming Growth Factor-beta super family. The gene encoding AMH is located in the short arm of chromosome.[6] Two AMH receptors type 1 receptor (AMHR-I) and type two receptor (AMHR-II) present on the AMH target organs.[7,8] AMH protein expression begins at the primary follicle stage, highest expression is detected in FSH-dependent pre-antral and small antral follicles of <4mm in diameter and AMH declines and absent in follicles larger than 8mm.[9,10] Cessation of AMH production essential for dominant follicle selection.[11]

The distinctive feature of PCOS is failure of follicular maturation, resulting in anovulation and accumulation of preantral and small antralfollicles, which may be contributed to high production of AMH.[12-14] AMH shows positive correlation with androgen level.[15-17] AMH levels may be related to the severity of PCOS, higher concentration of AMH in women with PCOS may associated with hyper androgenism which may also contributes for abnormal lipid metabolism and alerted lipid profile.[18-23]

In order to study the contribution of AMH in deranged Lipid metabolism and other PCOS related complications in women suffering from polycystic ovarian syndrome and its comparison with healthy control subject present study was planned.

METHODS

This study was carried out in the M.G.M. Medical college, Govt Holker College and K. R. G's Blessed Mom Centre, Indore (M.P.), during June 2016 to Dec 2017. Study comprised total 50 women Subjects among them 25 healthy women aged between 18 to 35 years taken as control and 25 women suffering from PCOS aged between 18 to 35 years, taken as cases. Fasting blood samples were collected from each subject and analyzed for AMH, cholesterol, triglycerides, HDL, LDL, VLDL levels. Serum AMH level were measured using ELISA technique, cholesterol, triglycerides, HDL, LDL, VLDL, were measured by enzymatic method on fully automated biochemistry analyzer.

Data were analyzed by using Statistical Program for Social Sciences Version (SSPS) software and data were expressed as (Mean ±SD) and comparison done by using student t-test and p-value. P-value <0.05 taken as significant and p-value <0.001 taken as highly significant.

RESULTS

Results shown in Table 1 revealed that the mean serum AMH level in cases was 8.66±1.99 and in control subject was 2.72±1.20. Result showed highly significant (0.001) increase in serum AMH level in cases when compare to control.

Table 1: comparison of serum AMH level between cases and control.

Parameters	PCOS(n=40)	Control(n=40)	p-value
AMH(ng/ml)	8.66±1.99	2.72±1.20	<0.001

Results revealed that there were significant (0.001) increase observed in serum total cholesterol, triglyceride, LDL, VLDL levels and significant (0.001) decrease observed in HDL level in PCOS group when compared to control as shown in Table 2.

Table 2: Comparison of lipid profile levels in cases and control.

Parameter	Control mean±SD	Cases mean±SD	P value
Cholesterol (mg/dl)	158±27	179±23	<0.001
Triglycerides (mg/dl)	89±20	134±27	<0.001
HDL (mg/dl)	54±19	35±8.5	<0.001
LDL (mg/dl)	75±23	115±37	<0.001
VLDL(mg/dl)	25±2.7	29±6.1	<0.001

DISCUSSION

The study show AMH level are 2 to 3-fold higher in women with PCOS compared with healthy women. The role of increased AMH in the follicular arrest in PCOS by inhibiting FSH early in folliculogenesis.[24] Elevated AMH contributes to the pathogenesis of PCOS. Some common factors which are closely related to PCOS pathophysiology are increased androgen level and insulin resistance which may due to AMH level. PCOS is characterized by an increase number of follicles at all growing stages, this increase is particularly seen in the pre-antral and small antralfollicles which primarily produce AMH, this AMH production is 2 to 3 fold higher in women with PCOS than in healthy women.[25-27] Increase serum AMH levels in PCOS would also reflect an intrinsic dysregulation of the granulosacells in which AMH itself could be involved since an over expression of the AMH receptor type 2 (AMHR 2) has also been demonstrated.[28] The expression patterns of AMH and its type 2 receptor in the postnatal ovary indicated the importance of AMH signalling in ovarian folliculogenesis. Granulosa cells of polycyctic ovaries have increased AMH mRNA expression, it is not only the increase number of follicles with resultant increase granulosa cell mass, but also greater production by individual granulosa cells that is underlying AMH over production in PCOS.[29]

Increased AMH may contribute to the development of hyperandrogenism in PCOS women which may be mediated by the reduction in aromatase activity in granulosa cells of polycystic ovaries, aromatase convert androgen to estrogens in granulosa cells.[30] Increased androgen can increase AMH through augmenting follicular growth.[31]

The Role of androgen, such as dehydroepiandrosterone (DHE-A) and DHEA-S, Promoting insulin resistance in PCOS women.[32] AMH and insulin resistance in PCOS may indirect relationship with lipid metabolism. Whereas lipid abnormalities were closely related to insulin resistance and obesity in PCOS, lipidosis contribute partly through lipolysis stimulation and altered expression of lipoprotein lipase and hepatic lipase. About 70 % of women with PCOS have abnormal lipid levels.[33,34]

Increase in triglycerides may be due the increase lipogenesis, reduced oxidation of fatty acids leads to increased secretion of VLDL particles by the liver resulting into elevated plasma triglycerides concentration. Hyperandrogenism also contribute for alerted lipid profile, hyperandrogenism has been associated with increased hepatic lipase activity and also has role in catabolism of HDL-C particles. Change of lipid lead to increased risk for premature atherosclerosis. LDL particles are atherogenic and are strongly associated with coronary artery disease.[35,36]

CONCLUSION

Serum AMH level is a good index of ovarian reserve, the best reflector of reproductive decline, precisely predict the age at menopause and higher serum AMH levels can be used as diagnostic and prognostic marker for PCOS. Elevated levels of AMH appear to play an important role in long term disruption of ovarian physiology and contributes the pathogenesis of PCOS and associated changes like hyperandrogenism and insulin resistance, premature atherosclerosis, Type 2 diabetes, cardiovascular desease. Study concluded the early estimation of AMH and lipid levels in women may decrease the risk of PCOS and associated complications, such as dyslipidemia, hypertension, obesity, infertility, type 2 diabetes, premature atherosclerosis, cardiovascular disease and other long-term complication.

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