

Correlation between AMH and TSH Serum Levels in PCOs and non-PCOs Sudanese Infertile Females

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Abstract: *Background:* Hypothyroidism and hyperthyroidism have been associated with altered ovarian function, menstrual irregularities, subfertility and higher (recurrent) miscarriage rates suggesting that thyroid hormone affects female reproductive organ^[1]. Anti-Müllerian hormone (AMH) is suggested as an important marker for ovarian reserve and in diagnosis of women with polycystic ovary disease PCOs^[2]. Increase number of couples facing problems with fertility and increase prevalence of thyroid diseases made this study important to be conducted. The main objective of this study was to assess the relation between serum levels of AMH and TSH in PCOs and non-PCOs Sudanese infertile females, and to assess relation between AMH levels and presence of PCOs. *Methodology:* Retrospective cross-sectional study was conducted from December 2016 to April 2017. Ninety seven women were recruited from the infertility outpatient clinic with different problems of infertility (primary and secondary). Forty five patients (46.4%) of them have PCOS in different levels of severity, Rotterdam 2003 criteria were used on clinical evaluation of PCOs, six patients (6.2%) have irregular cycle and three patient (3.1%) have amenorrhea, 43 patients were non- PCOs. Serum AMH and TSH levels were measured by enzyme linked immune sorbent assay (ELISA). *Results:* TSH and AMH serum levels were measured for all patients involved in this study. AMH mean 5.35 ± 7.34 ng/ml, TSH mean 1.60 ± 1.22 mIU/ml. A cutoff value of more than 2.5 mIU/ml for TSH were used to indicate hypothyroidism^[11]. We found there was a significant negative correlation between normal AMH levels ($1.2\text{--}3.0$ ng/ml) and TSH levels <2.5 mIU/ml, P-value - 0.002, a significant positive correlation between low AMH levels (<1.2 ng/ml) and TSH levels <2.5 mIU/ml, P-value 0.003. No significant differences were found in other groups and parameters correlation. AMH results was significantly increased in PCOS patients group (8.86 ± 9.07 ng/ml) when compared with non- PCOS group (2.61 ± 3.48 ng/ml); P-value = 0.003. *Conclusion:* Current study conclude that AMH levels had no relation to TSH serum levels in PCOs and non-PCOs groups Also we found that AMH levels were higher in patients with PCOs than those non-PCOs.

Keywords: PCOs, AMH, TSH

1. Introduction

Increasing number of infertile couples in developed & developing countries, as well as increasing numbers of women at their advanced reproductive age trying to conceive evoke the need of enabling more accurate investigation and tests that predict their ovarian function. Determination of AMH belongs to modern parameters, fulfilling enough these requirements.^[3]

AMH-description:

It is formed in females in ovaries from the 36th week of gestation. During the female life until menopause AMH levels reflect the number of primary and preantral follicles and thus is a marker for reserve of the ovary for reproduction. On the other hand it is not formed in FSH-dependent (antral) follicles.

The hormone passes in the blood and its levels can be measured. Target organs for AMH in both sexes are gonads.^[3] Measurement of serum AMH has several advantages: a lower intra- and inter-cycle variation, the independence from observers biases, and the possibility to be used in any clinical setting. For these reasons, AMH is widely recognized as a reliable biomarker of ovarian response.^[4]

AMH serve as an additional marker in diagnosis of polycystic ovary syndrome, where increased AMH levels

reflect the severity of the disease. Positive correlation of serum AMH with the number of antral follicles was found also in patients with PCOs.^[2]

A study done by J.Park, J.Kim and J.Rhee in Taegu, South Korea found that AMH levels were higher in PCOs patients than in other patients.^[5]

In humans, disturbances in thyroid hormone production are responsible for a dysregulation of the hypothalamus–pituitary–gonadal axis, and hypothyroidism is associated with oligomenorrhea. Thyroid dysfunction is a common endocrine disorder.

Prevalence of hypothyroidism was 4.6% (0.3 overt and 4.3% subclinical) and the prevalence of hyperthyroidism 1.3% (0.5 overt and 0.7% subclinical) in people without known thyroid disease or a family history of thyroid disease^[1].

Ideal test to detect subclinical thyropathies is TSH measurement.^[6]

Thyroid hormone disturbances and/or TPO-Ab associated with subfertility and early pregnancy loss, but the exact pathophysiology is unknown.^[7]

This study was conducted to assess the relationship between AMH and TSH levels in PCOs and non-PCOs Sudanese infertile females.

2. Materials and Methods

Retrospective cross-sectional study was conducted in Dr.Elsir Aboalhassan Fertility Center, Khartoum – Sudan from December 2016 to April 2017.

Ninety seven women were recruited from the infertility outpatient clinic with different problems of infertility (primary and secondary).

Patients who have hyperthyroidism or/and hypothyroidism were excluded. Forty five (46.4%) of them have PCOS in different levels of severity, Rotterdam criteria 2003 were used on clinical evaluation of PCOS. Six patients (6.2%) have irregular cycle and three patient (3.1%) have ammenorrhea. Forty three patients were non- PCOS.

AMH serum levels were measured by enzyme linked immunosorbent assay (AMH Gen II ELISA kit; Immunotech A Beckman coulter company, Brea, CA, U.S.A.).

TSH serum levels were estimated by enzyme linked immunosorbent assay (TSH ELISA kit; BIOS Chemux Bioscience, Inc, South San Francisco, U.S.A). Statistical analysis was done using IBM© SPSS© Statistics version 16.

3. Results

AMH and TSH were measured for all patients involved in this study.

Table 1: AMH and TSH Correlation

| | Low AMH (<1.2 ng/ml) | | Normal AMH(1.2- 3.0 ng/ml) | | High AMH (> 3.0 ng/ml) | |
|---------------------|----------------------|----------------|----------------------------|----------------|------------------------|----------------|
| | TSH <2.5mIU/ml | TSH >2.5mIU/ml | TSH <2.5mIU/ml | TSH >2.5mIU/ml | TSH <2.5mIU/ml | TSH >2.5mIU/ml |
| Mean & SD | 1.2845 | 0.6551 | 3.8498 | 0.53366 | 1.1637 | 0.53366 |
| Pearson Correlation | -0.589* | | 0.352 | | -0.002* | |
| Sig. (2-tailed) | 0.003* | | 0.648 | | 0.993 | |
| N | 23 | | 4 | | 22 | |
| PCOS & IR | 9 | | 1 | | 7 | |
| | | | | | 2 | |
| | | | | | | 30 |
| | | | | | | 5 |

*Correlation is significant at the 0.01 level (2-tailed)

IR= irregular cycle.

4. Discussion

In current study we found that there was no significance correlation between AMH and TSH levels as described before in a study conducted by Mohamed S. Sweed *et al* [8], and another study done by Tiina Murto *et al* also agreed with these results.^[9] Our study revealed that there was no significant difference in serum levels of TSH between PCOS and non-PCOS group, agreed with a study performed by Batool Hossei *et al* [10].

AMH results were markedly increased in PCOS patients group (8.86 ± 9.07 ng/ml) when compared with non- PCOS group(2.61 ± 3.48 ng/ml; *P-value 0.003*), these results agreed results of a study done by J.Park, J.Kim and J.Rhee. ^[5]

5. Conclusion

Our study conclude that AMH levels have no relation to TSH serum levels in PCOS and non-PCOS patients.

AMH mean 5.35 ± 7.34 ng/ml and the mean of TSH 1.60 ± 1.22 mIU/ml.

A cutoff value of more than 2.5 mIU/ml for TSH were used to indicate hypothyroidism^[11]

We found there was a significant negative correlation between normal AMH levels(1.2-3.0 ng /ml) and TSH levels <2.5 mIU/ml, *P-value - 0.002*.

Also there was a significant positive correlation between low AMH levels(<1.2 ng/ml) and TSH levels < 2.5 mIU/ml, *P-value 0.003*.

AMH results was obviously increased in PCOS patients group (mean 8.86 ± 9.07 ng/ml) when compared with non-PCOS group(mean 2.61 ± 3.48 ng/ml; *P-value 0.003*).

Nine patients with irregular cycle have AMH levels mean of 0.82 ± 1.67 ng/ml

No significant differences were found in other groups and parameters correlation

Age group from 19-25 include 24 patients, AMH mean 6.70 ng/ml and TSH mean 1.29 mIU/ml.16 of them had PCOS,26 patients ranges from 26-30 years old, AMH mean 5.49 ng/ml, mean TSH was 1.87 mIU/ml, 20 patient had PCOS. Age group from 31-35 years include 47 patient AMH mean 4.57 ng/ml, TSH mean 1.60 mIU/ml, and 18 had PCOs.

There was a negative relation between normal AMH levels and TSH levels less than 2.5 mIU/ml, and a positive relation between low AMH levels and TSH levels less than 2.5 mIU/ml. Also we found that AMH levels were higher in patients with PCOS than those they were non-PCOS.

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Author Profile



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