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Research Article

Correlation Between AMH and TSH in Infertile Women

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Abstract

Objective: The aim of this study is to indicate the association between Thyroid dysfunction and infertile women at different age group by measuring Anti-Müllerian hormone (AMH) level in respect of group of fertile reproductive women.

Methods: Prospective study was done on thirty six infertile women referred from prenatal clinic. Patients were divided into three age groups Group I < 35 (no = 13), group II 36-40 (no = 17) group II, 41 - 45 years (n = 5) respectively and 12 normal fertile women aged < 30 years without impact factors on thyroid and ovarian functions between 2015 and 2016. We assessed patient age, AMH, thyroid stimulating hormone (TSH) and thyroxin FT4 levels of all study participations as independent variables. to evaluate the relationship between AMH and thyroid hormone.

Results: The statistical analysis between infertile women showed that both thyroid stimulation hormone (TSH) level and the patient age were impact factor on AMH in infertile patient (patient age, TSH: patient but not in normal fertile patients. Mean age of studied women was 38.4 ± 5.0 years; their mean AMH was 1.3 ± 2.0 ng/mL and mean TSH 1.8 ± 0.9 µIU/mL.

Conclusions: AMH levels were inversely correlated with TSH levels in infertile women of reproductive age.

Keywords: *Anti-Müllerian Hormone (AMH); Thyroid Stimulating Hormone (TSH); Thyroxin (FT4)*

Introduction

Thyroid dysfunction is the most common endocrine disorder in women of reproductive age. Overt and subclinical hypothyroidism may cause menstrual irregularities and an ovulation [1] and has been associated with female infertility [2]. Thyroid dysfunction and autoimmune thyroiditis are known adverse risk factors for pregnancy as well as fertility, regardless of the presence of disease, in women of reproductive age [1] as well as the most common endocrine disorder in women of reproductive years [1-3]. Hypothyroidism may cause menstrual irregularities and is believed to increase miscarriage rates [4-6]. These observations led to the suspicion that thyroid function may influence in vitro fertilization (IVF) cycle outcomes. Whether clinical or subclinical hypothyroidism and/or thyroid autoimmunity affect female fertility and pregnancy potential in spontaneous and/or IVF cycles has remained subject of substantial disagreement [7-9]. Similarly, other study described comparable IVF pregnancy rates in women with normal TSH levels with thyroid autoimmunity and/or subclinical hypothyroidism [10]. These observations have led to the commonly adopted clinical practice of supplementing women trying to conceive with thyroxin if their TSH levels are ≥ 2.5 µIU/mL [11]. Investigations of this TSH cut off resulted, however, in conflicting results [12-14]. Cut off TSH value of 2.5 uIu/ml and 4.5 uIu/ml have been reported in comparable pregnancy and delivery rates in euthyroid *in vitro* fertilization (IVF) [15] other study showed that TSH < 2.5 µIU/m and anti-Müllerian hormone (AMH) ≥ 10 pmol/L (1.4 ng/ml) have significant role with unexplained infertility [11]. Further study suggested that a TSH 2.5 µIU/ml may be too low to impair reproductive function [16]. From the above summery how abnormal thyroid function affects female fertility remains unknown. Reported associa-

tions with menstrual irregularities and an ovulation in hypothyroidism suggest that thyroid dysfunction might impair follicular growth and maturation [3]. Assuming this to be the case, TSH levels should influence AMH concentrations, independent of thyroid autoimmunity and female age. This study is designed to find correlation between AMH and TSH in infertile women with no history of autoimmunity and/or subclinical hypothyroidism.

Method

Thirty six infertile women referred from prenatal clinic. Patients were divided into three age groups. Group I < 35 (no = 13), group II 36 - 40 (no = 17) group II, 41 - 45 years (n = 6) respectively and 12 normal fertile women aged < 30 years without impact factors on thyroid and ovarian functions between 2016 and 2017. We assessed patient age, AMH, TSH and FT4 levels of all study participations as independent variables to evaluate the relationship between AMH and thyroid hormone.

Blood samples were analyzed within two hours using (Tosoh A11, Japan). Patients were not on rehabilitation drug therapy. Patients were tested for Thyroid Peroxidase Antibody (TPOAb) and Thyroglobulin Antibody (TgAb) to exclude the presence of autoimmune thyroid disease (AITD) and the elevated antibody peroxidase or thyroglobulin [17]. Blood samples were tested for AMH, FT4 and TSH (0.8 - 2.0 ng/dl for FT4) and (0.5 - 5.0 mU/l for TSH) [18].

Statistical Analysis

Results were statistically analyzed by SPSS 11.5 for Windows. The mean and the standard deviation (SD) for all the variables were calculated. Analysis of variance F test (ANOVA) was used to compare the results of all examined cases in all studied groups. The differences between mean values for each tested variable have been tested by student's "t" test. The correlations between serum AMH and TSH were presented by correlation coefficient (r^2). Results considered non-significant or significant when P > or < 0.05, respectively [19].

Results

Correlation between serum levels of AMH, TSH, FT4 and age groups illustrated in table 1. Significant correlation was found between AMH and TSH (rs = -0.38, p < 0.004) by applying multiple regression analysis in infertile women but not in normal fertile women. Significant correlation was observed between AMH and age groups and (rs = -0.39, p < 0.005). No significant correlation was observed between AMH and FT4 (rs = 0.042 p-0.32).

	Fertile	**Infertile**			
Number of patients	12	17	13	6	
Indicator	< 35.0	< 35.0	36 - 40	41 - 45	*P value*
Age (yrs)	22.3 ± 4.1	24.4 ± 2.7	35.24 ± 1.54	1.54 ± 41.7	
AMH (ng/ml)	4.5	2.1 ± 1.7	1.15 ± 1.16	0.41 ± 0.47	0.004
TSH (U/ml)	1.9 ± 0.41	2.58 ± 0.7	3.1 ± 0.23	3.82 ± 0.43	0.071
FT4 (pmol/l)	15.7 ± 2.1	14.0 ± 1.8	13.6 ± 1.1	16.5 ± 1.7	0.32

Table 1*: Correlation between AMH, age group, TSH and FT4.*

The data are expressed as mean ± SD. AMH: Anti-Mullerian Hormone; TSH: Thyroid Stimulating Hormone and FT4: Free Thyroxin

The statistical analysis in post-matching between infertile and healthy women showed that both thyroid stimulating hormone (TSH) level and the patient age were impact factors on AMH in infertile patients.

Discussion

The correlation between AMH and thyroid function has remained unresolved. We in this study attempted to predict out correlation between thyroid function, and AMH in respect to age group. In this context it is important to note that this study was performed on women tested for Thyroid Peroxidase Antibody (TPOAb) and Thyroglobulin Antibody (TgAb) to exclude the presence of autoimmune thyroid disease (AITD) and the elevated antibody peroxidase or thyroglobulin to exclude secondary effects of cofounders that may be associated with abnormal thyroid function, like for example hyperprolactinemia.

Consequently, we here, even within normal thyroid function levels, are able to report a significant association of AMH levels with TSH. Significance was also affected by age, thus suggesting that here observed association of AMH and ages. However, women included in our study had a mean age of 35.2 ± 5 years. It would therefore be interesting to see whether the lack of association can be confirmed in a study group of young women. The results in this study suggested significant statistical association between in level of TSH and decrease in AMH concentration which agrees with other studies [16] suggested that hypothyroidism already from very mild stages on in all women negatively affects AMH concentration. These findings explain why thyroid hormone supplementation has been reported to improve pregnancy potential in euthyroid women with high-normal TSH levels [17]. Other study showed controversial results of the effect of thyroid autoimmunity and thyroid function on reproductive women [18] other showed significant association between TPO-autoantibodies and TSH increase [19,20] however, such results are out of our concern because our patients were tested for Thyroid Peroxidase Antibody (TPOAb) and Thyroglobulin Antibody (TgAb) to exclude the presence of autoimmune thyroid disease (AITD) and the elevated antibody peroxidase or thyroglobulin.

In this study significant statistical variation was observed between AMH and age agrees with other studies showed that AMH considered the most accurate marker of the growing follicle pool and, therefore, of ovarian function [21]. In general, higher AMH concentrations are associated with larger oocyte yields and improved pregnancy potential [22].

Conclusion

The results of this study showed that serum AMH levels in infertile patients, but not healthy fertile women were inversely correlated with patient age and TSH levels and patient age and TSH levels were shown to impact AMH levels in infertile patients. AMH levels were significantly lower in infertile patients than in healthy fertile women.

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