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Research Article

Estimation of Antimullerian Hormone in Infertile Women of Different Age Groups in Mosul

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Abstract

Serum antimullerian hormone (AMH) is considered a remarkable marker of ovarian reserve. The current study attempts to estimate AMH levels at different age groups of infertile and control women in Mosul. The study included 300 control and 300 infertile women attended Al-Khansa teaching Hospital and private clinic divided into three age groups < 30, 30 - 39 and > 40 years old. AMH was estimated in sera of women using fluorescent immunoassay. The results showed that AMH was higher in control than infertile women at different age groups ($p < 0.001$). There was constant decrease of AMH with advanced age both in control and infertile women although the reduction was more in infertile women ($p < 0.005$).

Keywords: *Antimullerian Hormone; AMH; Infertility*

Introduction

There are many causes of infertility in women and one of them is decreased ovarian reserve. The women ovarian follicles both quantity and quality are related to age and FSH [1,2] however different studies showed the number of follicles was correlated to antimullerian hormone (AMH) levels [3-5]. This is evidenced by the fact that AMH is deceased with age [6-11]. This decrease of ovarian follicles might be due to autoimmune, iatrogenic and genetic conditions [12] as well as radiation, endocrinopathy and pelvic surgery [13-15].

Antimullerian hormone is a glycoprotein belonging to transforming growth factor superfamily, secreted by granulosa cells of preantral and small antral follicles [5,6,16]. The relation between AMH and clinical results is contradictory, however it is highly specific and accurate marker of polycystic ovary syndrome [17,18].

The current study aims to estimate AMH levels in different age groups of infertile and fertile women in Mosul.

Materials and Methods

Subjects

The study included 300 patients, attended Al-Khansa Teaching Hospital and private clinic complaining from infertility, for the period April 2019 to December 2019. Those women met the inclusion criteria [5,17,19-21] which include:

- Age between 20 - 47 years old.
- Presence of regular menstrual cycle.
- Primary infertility.
- Presence of both ovaries.
- No exposure to radiation or using cytotoxic drugs.
- No hormonal treatment.
- Polycystic ovary.

Patients were divided according to the age into three subgroups: < 30 , 30 - 39 and > 40 years old, each 100 patients. Control group consisted of 300 normal fertile women divided into the same subgroups as patients, each 100 women.

Measurement of AMH

Blood samples from each patients and control were taken and serum was separated and stored in deep freeze until the time of the assay. Serum AMH was assessed by fluorescent immunoassay (Bidotech Med Incorporated, Korea). The sensitivity of the assay was0.02 and the range of the assay of AMH was 0.02 - 10.0 expressed in ng/ml.

Statistical analysis

Data was presented as mean ± standard deviation calculated by SPSS software. P value ≤ 0.05 was considered statistically significant. Unpaired t-test was used to compare the levels of AMH in patients and control groups. One-way ANOVA was applied to determine any significant difference of AMH levels between groups.

Results

The mean age of control women groups < 30, 30 - 39 and > 40 years were 25.8, 34.7 and 42.6 years respectively, while the mean age of patient groups < 30, 30 - 39 and > 40 years were 24.6, 35.3 and 42.6 respectively (Table 1).

Age group	Mean Age		Total Number
	Control	Patients	
< 30	25.8	24.6	200
30 - 39	34.7	35.3	200
> 40	42.6	42.6	200

Table 1: *The mean age of different age groups in control and patient women.*

The mean level of AMH in control women at age group 30 years was 4.114 ng/ml higher than patients (2.628 ng/ml) and the difference was highly significant P < 0.001 (Figure 1).

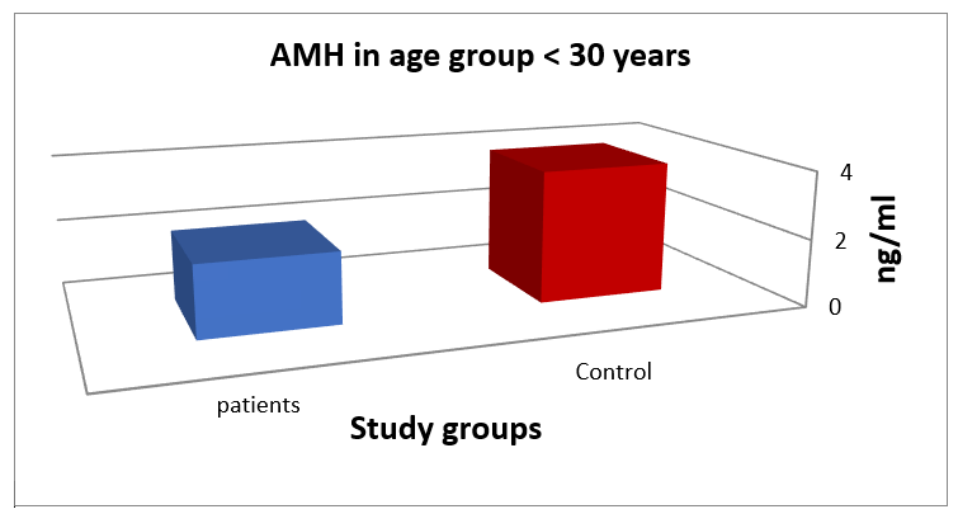

Figure 1: *The mean levels of AMH in the study groups at age group < 30 years.*

Also, the mean levels of AMH in control women at age group 31 - 39 years was 2.115 ng/ml, higher than patients (1.363 ng/ml) and the difference was highly significant P < 0.008 (Figure 2).

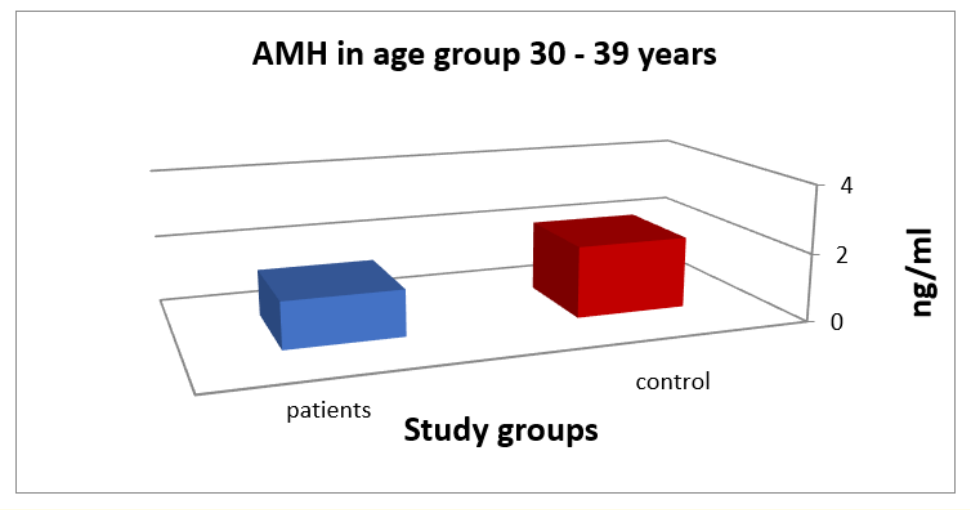

Figure 2: *The mean levels of AMH in the study groups at age group 30 - 39 years.*

Similarly, highly significant difference P < 0.000 was noticed in age group > 40 years between control and patients (Figure 3).

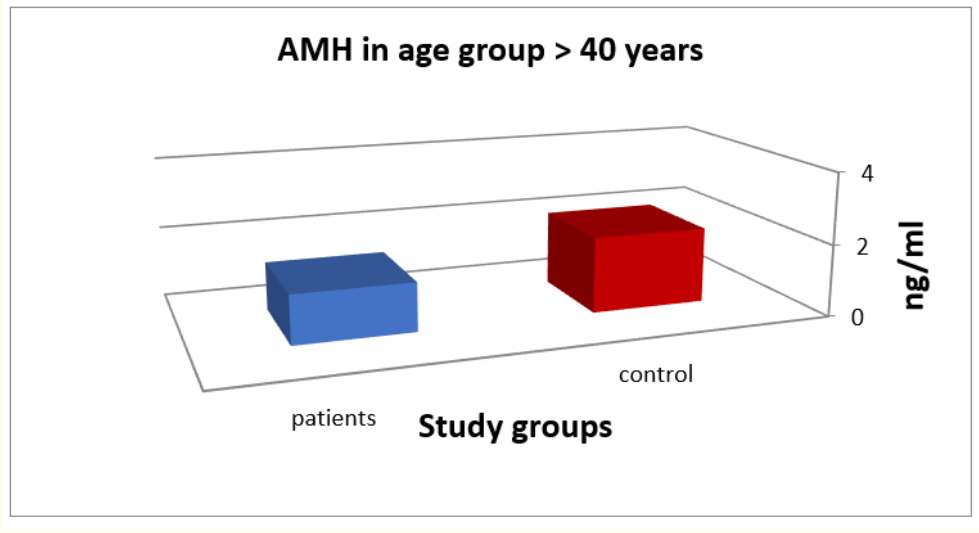

Figure 3: *The mean levels of AMH in the study groups at age group > 40 years.*

The distribution of AMH levels among control and infertile women at different age groups is shown in figure 4. The mean level of AMH decreased steadily in a manner highly correlated with advanced age although the reduction of AMH level was more in patients ($P < 0.000$).

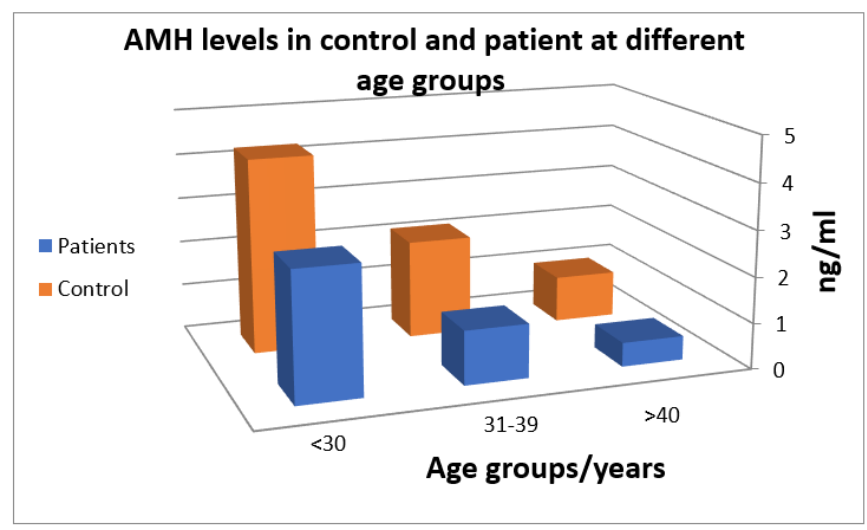

Figure 4: *Distribution of AMH levels in control and patients at different age groups.*

The statistical details (unpaired t-test and ANOVA) of AMH levels in patient and control at different age groups are shown in table 2 and 3.

Age groups (years)	Study groups	Numbers	Mean	SD	t-value	P-value	Cohen's d	Duncan
< 30	Patients	100	2.800	0.38	5.237	0.001**	0.620+	A
	Control	100	4.237	3.25				
31- 40	Patients	100	1.175	0.38	3.623	0.008**	1.435++	B
	Control	100	2.162	0.85				
> 40	Patients	100	0.525	0.29	6.804	0.000**	1.974++	C
	Control	100	1.025	0.21				

Table 2: *Unpaired t-test for AMH levels in patients and control at different age groups.*

*** Significant difference existed at p < 0.01, SD = Standard Deviation.*

+ = It means ('medium' effect size).

++ = It means ('large' effect size).

S.O.V.	S.S.	df	M.S.	F	P-value	Eta2
Between Groups	21.970	2	10.985	89.068**	.000	89.4%
Within Groups	2.590	21	.123			
Total	24.560	23				

Table 3*: ANOVA test for AMH levels between groups.*

***: According to ANOVA p < 0.01 for each age group, means with different letters " vertically for each age group according to Duncan test.*

Discussion

The introduction of AMH in the reproductive endocrinology considered a revolution in the prediction of ovarian reserve [22,23]. Ovarian reserve is defined as interplay between quantity and quality of follicles left in the ovary. A gradual decrease of oocytes both in quantity and quality is a process of female reproduction aging [9,24,25]. Therefore, AMH is regarded as a marker of ovarian reserve although other tests are available to predict ovarian reserve including antral follicle count and FSH levels [26]. However, AMH has many characters such as independence on cycle, intercycle and operator [27,28]. Women with very high AMH had increased rates of menstrual disturbance and increased features of PCOS [18].

The current study showed lower levels of AMH in infertile women compared to control. The mean level of AMH was decreased steadily with age in control and infertile women at age groups < 30 - > 40 years. These results supported previous studies in relation of between low level of AMH and poor ovarian response [9-11,21,25,26,29]. On contrast Seckin., *et al.* [30] concluded that AMH was not a strong prediction factor of pregnancy.

Negative correlation existed between AMH levels and age both in control and patients, AMH started to decrease at age 28 years in control and at 26 years in patients and the differences was significant (p < 0.005). An Indian study showed decreased of AMH levels at 27 years others showed decreased at 30 years [31]. Data obtained from different infertility studies using different assays showed variable results of AMH value [8,32].

An ideal ovarian reserve test should be reproducible with limited inter and intracycle variability and highly specific to minimize the risk of incorrect results. No measures of ovarian reserve are perfect, however AMH and age are good predictive value. The data here differ from others probably due to limited numbers as well as using different system for estimation of AMH which could participate to the variable levels of AMH [33]. The major problem of AMH is the lack of reference values for ethnic and demographical locations. This study also showed the need for AMH testing after 30 years to monitor ovarian reserve as the hormone declined steadily.

Conclusion

This study showed that the level of AMH in infertile women was lower than control and was negatively correlated with age.

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