The Relation of Anti Mullerian Hormone Serum Level with Blood Group Type of Reproductive-age Women in Babylon City in Iraq: A Cross-sectional Study

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ABSTRACT

Background: Blood group scheme (ABO) connected to ovarian storage as mirrored by the anti-Müllerian hormone; it is essential to reflect and evaluate the ovarian storage of ova. The objective of the study is assessment any association between blood group and serum level of anti-Müllerian hormone.

Methods: This cross-sectional study evaluated and assessed 144 women attending private fertility care clinics in Babylon province between January 2019 and January 2020. These women were with a mean age of 30 (20–35) years and mean body mass index 25 kg/m2 (18–30 kg/m^2); for whom Antimullerian hormone and blood group type assessed.

Results: No significant association between blood group and AMH for A group; OR = 1.6, CI = 0.6–4.1. For group B; OR = 1.3, CI = 0.9–1.2. For group O; OR = 0.9, CI= 0.4–2.5. While AB vs. non-AB: OR= 3.36, 95% CI: 1.01–11.26 shows a significant relationship with AMH serum level.

Conclusion: No association between blood group scheme and ovarian storage that evaluate by AMH. However, AB blood type may be protective against low AMH serum levels. Large sample sizes study all over the country is required for further evaluation.

Keywords: ABO blood group, Anti Mullerian Hormone, Ovarian reserve.

INTRODUCTION

Ovarian reserve assessment in women seeking fertility treatment is a vital step. Many methods for assessing ovarian reserve (follicle size, and the residual time that females have to be pregnant) include high follicle stimulating hormone (FSH) level, low volume of ovary, antral Follicle mount, AMH serum level, and inhibin B levels.[1] Anti-Mullerian Hormone (AMH) is a glycoprotein hormone organizationally correlated to inhibin besides activin from the converting growth element beta superfamily, whose essential roles are growth, difference, and folliculogenesis.[2] AMH is produced by granulosa of the antral follicle and preantral follicle in females. Therefore, AMH is found in the ovary till menopause.[3] AMH production control folliculogenesis by preventing follicles' employment from the stagnant pool to choose the main follicle; after that, AMH production was reduced.[4] AMH is considered a molecular marker for the comparative size of the ovarian replacement, enclosing each egg and giving it energy.[5] High AMH levels in females aged 35–44 years old while no association and low AMH levels in females aged 20–35.[6] ABO blood group scheme represents that A and B antigens can be found individually or together on erythrocytes, molecule were found on epithelial cells, platelets, the vessels, and neurons.[7] Some studies had found that ABO blood groups are related to the occurrence of specific diseases and their complications.[8,9] During the late seventies, research works did not find any relation between the ABO blood group and fertility.[10,11] Until 2008, *Binder et al.* reached by their research that Ovarian Hyper Stimulation Syndrome (OHSS) develops less frequently in blood type O, blood group (A) more associated with early start OHSS.[12] A paper published by Nejat and coworkers in 2011 implied the possibility of an association between blood group and ovarian replacement. Female with O blood group have reduced ovarian reserve,[13] the information for this is inconsistent.[14,15] Such conflicting results raise our curiosity about the relationship between ABO blood type and AMH

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level as a marker of ovarian reserve in a sub-set of Babylonian women.

MATERIALS AND METHODS

This cross-sectional study included 144 women (n = 144) who attended Al-Amel private clinic for fertility assessment and management in Babylon, Iraq, for one year (January 2019-January 2020). All participants gave verbal and written consent. The ethical research committee of the College of Medicine, University of Babylon, approved the study.

Inclusion Criteria

1. Middle reproductive age females (20 to 40) years old
2. Body mass index (BMI) (20–29.9) kg/m^2.
3. Neither smoker nor contraceptive user.

Exclusion Criteria

1. Women, who did not give consent for participation in the study.

2. Pregnant women.
3. Women with any hormonal disturbances.

Data for each patient included age, BMI, and regularity of menstrual cycle obtained. AMH level was assessed for all females on the 2nd day of MC by using ultra-sensitive enzyme-related immunosorbent evaluate AMH Gen II ELISA Kit (Beckman Coulter). ABO blood group was done using ABO specific Kit for women who did not know their blood group.

Statistical Analysis

SPSS 22 software used for data collection and analysis, ANOVA test quantity information. Categorical data used CHI square test and Fisher-exact tests. Bivariate regression was used to detect the odds ratio. A p-value < 0.05 considered statistically significant.[14]

RESULTS

One hundred and forty-four (144) women were involved in this study. The baseline characteristics of the studied group are shown in Table 1. The mean subject age was 30.40±6.43 years, (74.30%) were less than 35 years, (60.4%) were overweight (Table 1).

There were no significant differences in age, BMI, and menstrual regularity in different blood groups types (p > 0.05), as shown in Table 2.

Blood Type and AMH Serum Level

Comparison of AMH serum levels in different blood group types is shown in Table 3. There was an insignificant difference in AMH serum level in different groups (p > 0.05).

ANOVA Test

Bivariate regression analysis was used to explore any association between AMH and blood group as a sign of ovarian reserve. AB blood group versus non-AB-type shows significant association as shown in Table 4.

Table 1: Characteristics of study group (age, BMI, blood group type and menstrual cycle history)

Variables	Groups	Number	%
Age, years 30.40 ± 6.43 (mean)	<35	107	74.30
	>35	37	25.7
BMI, Kg/m^2 25.40 ± 3.11 (mean)	18-24.9	57	39.6
	25-29.9	87	60.4
Blood group type	A	40	27.8
	B	42	29.2
	AB	14	9.7
	O	48	33.3
Menstrual cycle (days) & Regularity	21-28	87	60.4
	29-35	8	5. 6
	36-40	1	0.7
	Irregular	48	33.3

Table 2: Comparison of study groups according to age, BMI, and menstrual regularity in different blood group types. (Values are mean ± SD)

Blood groups	Number	A	B	AB	O	P-value
Age (years)	<35	32	26	12	37	0.29^a
	>35	8	16	2	11	
BMI (Kg/m2)	18-24.9	22	14	5	16	0.135^b
	25-29.9	18	28	9	32	
Menstrual Cycle Days & Regularity	21-28	26	27	7	27	0.88^a
	29-35	1	4	1	2	
	36-40	1	0	0	0	
	Irregular	12	11	6	19	

^{a} Fisher-exact test
^{b}Chi square test

Table 3: Comparison of AMH serum level in different groups of blood type.

Blood group type	A	B	AB	O
No	40	42	14	48
AMH ng\dL (Mean ± SD)	3.6215 ± 2.68	3.8362 ± 2.02	5.1714 ± 3.75	3.4267 ± 2.79
P-value	0.43			

Table 4: Relationship between different ABO blood types and AMH serum level.

Blood groups		A vs. non A	B vs. non B	AB vs. non AB	O vs. non O
AMH ng\dL	Odds ratio	1.57	1.33	3.36	0.93
	95% CI	0.59-4.17	0.93-1.20	1.01-11.26	0.35-247
P-value		0.37	0.09	0.04	0.89

Bivriant regression test

DISCUSSION

Numerous studies have recently focused on the connotation between the ovarian reserve and the ABO blood group, which is associated with supported reproduction technologies outcome. Our study didn't find any significant difference between different blood group types regarding AMH serum level when it was used as a marker for evaluating ovarian reserve. This result has been reached by Turkish and Suadian research teams in their countries,[16.17] taking into consideration that they used FSH as a marker for ovarian reserve while we used AMH for the assessment. Using the Biavariant method to determine if any of these blood group types may constitute a risk factor for low serum MAH level, we found that the O blood group is a risk factor for decreasing AMH serum level AB blood group is protective against that. (Odds ratio: 3.36; CI: 1.01-11.26). We may explain this result association by that the enzyme glycosyltransferases, which plays an important role in forming the A and B antigens[18] is absent in O, and because many follicles receptors for gonadotropins (like FSH-receptor and luteinizing hormone receptor) are deeply glycosylated proteins. Williams and Stanley observed in 2009 that ovulation rate was decreased in mice with oocyte-specific removal of a glycosyltransferase, N-acetylglucosaminyl transferase.[19] In a similar study by Nejat and Team (2011), women with O blood type showed significantly lower ovarian reserve reflected by FSH serum level than women of A or AB blood group. They explained that the A antigen might protect against the diminished ovarian reserve.[13] Our work result in 2014, which searched women with premature ovarian failure and the risk factors for it, originated that blood group O is a dangerous reason that could add evidence to our recent study.[20] De Mouzon and his teamwork used AMH as a marker for assessing ovarian reserve; as we did; but they did not reach the same result as ours.[21] Their study was for a longer duration and included larger sample size, so to confirm or regret, we recommend a larger sample size and a longer duration of the study.[22,23]

CONCLUSION

No association was found between the blood group scheme and ovarian storage, evaluate by AMH. However, AB blood type may be protective against low AMH serum levels. Further, a large sample size study all over the country is required for further evaluation.

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