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The Correlation between Anti-Mullerian Hormone Levels and The Number of Oocyte Retrieved and Pregnancy Rate in Infertile Women Who Underwent IVF in Makassar City

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ABSTRACT--- *Anti-Mullerian hormone (AMH) being a good marker for ovarian response. Decrease serum AMH levels may be indicative for poor response in vitro fertilization (IVF) in women with a diminished ovarian reserve This study aims to determine the serum level of AMH correlation with the number of oocyte retrieved and pregnancy rate in infertile women. This cross-sectional study was eligible for 254 infertile women underwent in vitro fertilization in private IVF Clinic in Makassar. AMH serum levels were measured on cycle day 3. The number of oocytes were determined on the day of oocyte retrieval. Pregnancy was determined by the β-hCG test on day 16 of the cycle. Serum AMH levels show a significant negative correlation with women <35 years (r=-0.178; p=0.029) and a negative correlation but not significant with women age ≥35 years (r=-0.144; p=0.144). Conversely, AMH levels and the number of oocyte retrieved show a significant positive correlation (r=0.507, p=0.000). Chemical pregnancy does not correlate with AMH levels (p>.05). The AMH levels and the number of oocytes retrieved might predict the ovarian function. AMH levels could not predict the pregnancy rates.*

Keyowrds--- *AMH, oocyte, pregnancy rate, IVF*

I. INTRODUCTION

Anti-Mullerian hormone (AMH) is a glycoprotein hormone as a member transforming growth factor β-family produced by the granulosa cells of primary follicles (Massague, 1990; Anderson, 2012). AMH have been established as a reliable marker of ovarian reserve Lie et al., 2008; Peigne, 2014). Decrease serum AMH levels may be indicative for poor response in vitro fertilisation (IVF) in women with a diminished ovarian reserve (Laven et al., 2004; van Rooij et al., 2005).

Oocytes and embryos significantly impact the outcomes of IVF. Serum AMH strongly correlates with the number of developing follicles (Laven et al., 2004). Therefore, the present study aims to determine the correlation between serum AMH levels and the number of oocytes retrieved and the chemical pregnancy on women undergoing IVF cycle.

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II. METHODOLOGY

Subjects

A cross-sectional study was conducted at Morula IVF Makassar Clinic from January – December 2018. The eligible women in this study were divided in two groups : women with age <35 years and ≥35 years. All the women in this study were undergoing IVF first cycle. Written informed consent were obtained from all of the participants.

Antral follicle count (AFC)

The baseline follicles were measured at cycle day 2 with transvaginal ultrasound (Alpinion E-Cube 8, 2017) in each ovary before controlled ovarian hyperstimulation. The sum of both follicles counts as the antral follicle count (AFC).

FSH and AMH levels

Serum FSH and AMH levels were measured on cycle day 2 prior to controlled ovarian hyperstimulation. The serum FSH levels were measured using eletrochemiluminescence immnuoassays (Roche Diagnostics). The analytical sensitivity, intra-assay and inter-assay coefficient of variation for FSH were <0.1 mIU/mL, 2.8 and 4.5, respectively. The serum AMH levels were measured using a diagnostics system laboratories by ECLIA (Cobas System). The analytical sensitivity was LoD 0.010 ng/mL and LoQ 0.030 ng/mL.

Control ovarian hyperstimulation

Controlled ovarian stimulation was achieved using a daily dose of recombinant FSH (Gonal-F; Serono, Geneva, Switzerland) starting on day two or three of the cycle. Follicular growth was monitored using transvaginal ultrasound examination. Recombinant hCG (Ovidrel; Serono, Geneva, Switzerland) was administered to trigger final follicular maturation when adequate follicular growth was observed.

Number of oocyte retrieved

The oocytes were collected 35 hours after hCG administration through transvaginal ultrasound-guided oocyte retrieval (OR) or ovum pick-up (OPU). Number of oocyte retrieved were calculatated on the day of OR.

Statistical analysis

Pearson correlation test was used to determine the correlation between serum AMH levels with age and number of oocyte retrieved. Fisher's exact test was used to determine the correlation between serum AMH levels and chemical pregnancy rate. The p-value <.05 was considered statistically significant.

III. RESULTS

FSH levels in women <35 years are slightly lower compared with women ≥35 years. Conversely, AMH levels are higher in women <35 years compared with ≥35 years group. AFC and number of oocytes retrieved

were higher in women <35 years (14.02±5.55 and 14.17±6.68, respectively) compared with women ≥35 years (11.51±4.36 and 11.60±5.41, respectively). Positive chemical pregnancy also higher in women <35 years (n = 24) compared with age ≥35 years (n = 12).

Table 1: Patient's characteristics

Characteristics	<35 yrs	≥35 yrs
n	150	104
FSH	6.57±1.90	6.94±1.72
AMH	4.54±3.34	3.90±4.38
AFC	14.02±5.55	11.51±4.36
No. of oocyte retrieved	14.17±6.68	11.60±5.41
Chemical pregnancy		
Positive	24	12
Negative	126	92

Correlation between AMH levels and women's age, the number of oocytes retrieved and chemical pregnancy are shown in table 2. Serum AMH levels show significant negative correlation with women <35 years (r=-0.178; p=0.029) and a negative correlation but not significant with women ≥35 years (r=-0.144; p=0.144). Conversely, AMH levels and the number of oocytes retrieved show a significant positive correlation (r=0.507, p=0.000). Chemical pregnancy does not correlate with AMH levels (p>.05).

Table 2: Correlation between AMH and patients characteristics

Characteristics	AMH level	
	r	p
Age (years)		
<35	-0.178	0.029
≥35	-0.144	0.144
No. of oocyte retrieved	0.507	0.000
Chemical pregnancy	0.127	0.454

IV. DISCUSSION

Our study found a positive correlation between serum AMH levels and the number of oocytes retrieved. Similar to the present findings, previous studies showed a positive correlation with the number of oocytes retrieved in both women under and above 35 years who underwent their first IVF cycle (Fong et al., 2008; Iliodromiti, 2015; Zhang et al., 2019). Further findings from another study showed women with normal AMH levels had significantly higher numbers of good quality oocytes compared with low or high AMH levels (Re-Enner et al., 2006). Therefore, AMH levels might help in predicting oocytes' quality and quantity (Irez et al., 2011). A possible explanation for this might be explained from AMH regulation to select the dominant follicle

through the inhibitory effects of AMH on the initial recruitment of primary follicles from the preantral follicles (Durlinger et al., 2001). Another mechanism is the regulation of FSH sensitivity in the human ovary (Kevenaar et al., 2007).

Conversely, there was no correlation between the number of retrieved oocytes and the AMH level from the previous study (Gupta et al., 2017). The discrepancies between AMH levels effect on the number of oocytes retrieved among studies due to the stimulation regimen. The stimulated cycle of IVF decreases the AMH levels gradually during the follicular phase (Fanchin et al., 2003). Serum AMH levels did not change in the spontaneous cycles but progressively decreased in the stimulated cycle with exogenous FSH (La Marca et al., 2004). Furthermore, serum AMH concentration was decreased gradually until the day of hCG administration (Lee et al., 2010).

Another finding from the present study is the lack of correlation between AMH levels and the chemical pregnancy. Conflicting results show in a study by Ishii et al. This study found AMH levels correlated with the pregnancy rate regardless of the AMH levels in all participants. However, there was a correlation found between AMH levels group (<1, 1-2, 2-3, and 3≦ ng/mL) and the pregnancy rate (Ishii et al., 2019). Therefore, the pregnancy rate might differ due to discrepancies on AMH levels.

V. CONCLUSION

The AMH levels predict the outcome of IVF cycle on number of oocyte retrieved but could not predict the pregnancy rate.

Disclosure statement

The authors report no conflict of interest.

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