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AGE-BASED INTERPRETATION OF ANTI-MULLERIAN HORMONE (AMH) LEVELS IN FERTILE AND INFERTILE WOMEN

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ABSTRACT

INTRODUCTION: Data related to AMH levels in fertile women are scarce, making interpretation for this population difficult. We aimed to characterize age-based AMH levels both in fertile and infertile women population to simplify interpretation of AMH results. This study represents the largest analysis to date of AMH levels in fertile women.

MATERIALS AND METHODS: This cross-sectional study analyzed serum AMH from 543 infertile women and 492 healthy controls, whose mean ages were 20-50 years. Sample collection was performed by random sampling and analyzed with SPSS version 16 software. AMH levels were abstracted from electronic medical records. AMH levels were measure by an independent laboratory RV Metro Polis by Chemiluminescence method.

RESULTS: There were significantly lower mean serum AMH levels among infertile women compared to the control group. The mean AMH serum levels from different ages of infertile and control group (fertile women) decreased with increasing age.

CONCLUSION: We have observed decreased AMH levels with increasing age both in fertile and infertile women from 20 to 50 years of age. Assessments of AMH levels indifferent age group of female can help in predicting ovarian reserve in infertile women.

KEYWORDS : Anti-müllerian Hormone, Infertile, Fertile, Age .

INTRODUCTION:

The anti-Müllerian hormone is a hormone produced by granulosa cells of growing follicles (during early stages of their development) in the ovaries. This hormone determines ovarian reserve in other words it defines the quantity but not the quality of follicles in the ovaries. The quantity and quality of a woman's ovarian follicle pool are considered to be related to her age and follicle-stimulating hormone (FSH) level [1]. However, recent studies have shown that the number of follicles is well correlated with the level of anti-Müllerian hormone (AMH) [2], which is mainly produced by the granulosa cells of the preantral and small antral follicles in women [3, 4]. Serum AMH concentration correlates with the quantity of primordial follicles in the ovarian tissues [5], thus reflecting the number of dormant follicles in adult women. This is evidenced by the fact that AMH levels decrease with age [6,7,8]. Moreover, receiver operating characteristic curve analysis of serum AMH concentration has been reported to be a highly accurate diagnostic tool for polycystic ovary syndrome (PCOS) [9]. The anti-Müllerian hormone is tightly related to issues of fertility and of high importance to those who are trying to conceive. It has been used as an ovarian reserve marker since 2002. The ovarian reserve is also a strong indicator of the pregnancy treatment outcome.

Data related to AMH levels in fertile women are scarce, making interpretation for this population is difficult. We aimed to characterize age-based AMH levels in fertile and infertile population to simplify interpretation of AMH results. When using an AMH marker in daily clinical practice, it is necessary to know its age-specific reference values. In our study, we attempted to evaluate retrospectively the age-specific AMH reference values based on a large set of samples taken from RV Metropolis. our aim was to investigate the changes in serum concentrations of AMH at different ages and its correlation with ovarian reserves in infertile women.

METHODS:

This retrospective cohort study includes all women undergoing fertility assessments at different Fertility Medical Practice centers, whose serum samples was referred to RV Metropolis Diagnostic and Healthcare centre Pvt Ltd. AMH levels were abstracted from elect ronic medical records. AMH levels were measured by Chemilu mine scence method.

Exclusion criteria included current use of psychotropic or hormonal medications, including hormonal contraception and hormone therapies; pregnancy or breast feeding; serious health problems known to compromise ovarian function (*e.g.* diabetes mellitus, liver disease, breast or endometrial cancer); and alcohol or drug abuse in the past year. Patients were stratified into the following age categories: 20-24yrs., 25-29, 30-34, 35-39,40-45 and 45-50 years.

DATA ANALYSIS

The data were presented as mean ± standard deviation as calculated in each group by SPSS software version 16.The student's t-test was used to assess differences between mean values of AMH, in the infertility and control(fertile) groups with a p value <0.05.

RESULTS

Table 1 shows the mean and SD of AMH levels according to the six age categories. Overall there was a significantly lower mean AMH serum level in infertile women compared to the fertile group ($p< 0.05$). Although the mean serum AMH levels consistently decreased with increasing age in both infertile and fertile groups, the reduction seen in the infertile group was more ($p<0.05$),(Fig 1).

DISCUSSION

In this study infertile women had lower levels of AMH levels than fertile women.

The range of AMH observed in infertile women was approximately two folds less than the fertile group. Mean serum AMH levels steadily decreased with increasing age in the age range of 20 to 50 years and was attributed to reduced ovarian reserve. Since AMH are produced by preantral and antral follicles (10-16), hence with increasing age, levels of pre-antral follicles decrease, causing a reduction in the amount of AMH. Thus, lower levels of AMH show declining ovarian reserve. Decreased AMH can be considered as a marker for reduced fertility potential. Hence, the most appropriate factor for the assessment of ovarian reserve is an evaluation of AMH levels, which are independent of the cycle.

These results supported those of previous studies in terms of the connections between low AMH serum levels and poor ovarian res ponse (17,18,19). Several studies examined decreased AMH with age.

Seifer et-al. (16) reported that mean AMH levels decreased steadily with increasing age, in the range from 24 to 50 years, which was similar to the results of the current study.

CONCLUSION

With increasing age AMH levels decrease due to reduced ovarian reserves. Hence AMH can be used as a marker for the assessment of ovarian reserves in the follicular and luteal phases.

FIG 1 Mean values of AMH over the reproductive age range in fertile and infertile women

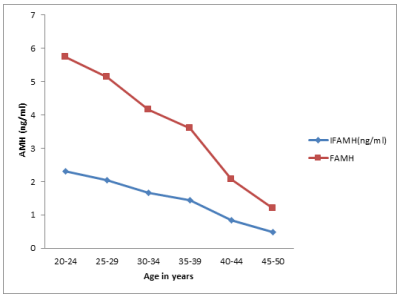

Table 1 Changes in anti-Mullerian hormone (AMH-ng/ml), conc entrations for different ages of women in the infertile and fertile groups

AGE(yrs)	FERTILE	INFRTILE	P VALUE
20-24	5.74±3.9	2.3±1.56	<0.05
25-29	5.13±3.8	2.05±1.52	<0.05
30-34	4.16±3.3	1.66±1.32	<0.05
35-39	3.6±2.9	1.44±1.16	<0.05
40-44	2.06±1.9	0.824±0.76	<0.05
45-50	1.2±0.8	0.48±0.4	<0.05

REFERENCES

1. de Vet A, Laven JS, de Jong FH, Themmen AP, Fauser BC. 2002. Antimüllerian hormone serum levels: a putative marker for ovarian aging. Fertil Steril 77:357–362 [PubMed] [Google Scholar]
2. Gruijters MJ, Visser JA, Durlinger AL, Themmen AP. 2003. Anti-Müllerian hormone and its role in ovarian function. Mol Cell Endocrinol 211:85–90 [PubMed] [Google Scholar]
3. Feyereisen E, Méndez Lozano DH, Taieb J, Hesters L, Frydman R, Fanchin R. 2006. Anti-Müllerian hormone: clinical insights into a promising biomarker of ovarian follicular status. Reprod Biomed Online 12:695–703 [PubMed] [Google Scholar]
4. Scheffer GJ, Broekmans FJ, Looman CW, Blankenstein M, Fauser BC, teJong FH, teVelde ER. 2003. The number of antral follicles in normal women with proven fertility is the best reflection of reproductive age. Hum Reprod 18:700–706 [PubMed] [Google Scholar]
5. van Rooij IA, Broekmans FJ, te Velde ER, Fauser BC, Bancsi LF, de Jong FH, Themmen AP. 2002. Serum anti-Müllerian hormone levels: a novel measure of ovarian reserve. Hum Reprod 17:3065–3071 [PubMed] [Google Scholar]
6. Yang YS, Hur MH, Kim SY, Young K. 2011. Correlation between sonographic and endocrine markers of ovarian aging as predictors for late menopausal transition. Menopause 18:138–145 [PubMed] [Google Scholar]
7. Hansen KR, Hodnett GM, Knowlton N, Craig LB. 2011. Correlation of ovarian reserve tests with histologically determined primordial follicle number. Fertil Steril 95:170–175 [PubMed] [Google Scholar]
8. La Marca A, Broekmans FJ, Volpe A, Fauser BC, Macklon NS; ESHRE Special Interest Group for Reproductive Endocrinology–AMH Round Table 2009. Anti-Mullerian hormone (AMH): what do we still need to know? Hum Reprod 24:2264–2275 [PubMed] [Google Scholar]
9. van Rooij IA, Broekmans FJ, Scheffer GJ, Looman CW, Habbema JD, de Jong FH, Fauser BJ, Themmen AP, te Velde ER. 2005. Serum antimullerian hormone levels best reflect the reproductive decline with age in normal women with proven fertility: a longitudinal study. Fertil Steril 83:979–987 [PubMed] [Google Scholar]
10. van Disseldorp J, Faddy MJ, Themmen AP, de Jong FH, Peeters PH, van der Schouw YT, Broekmans FJ. 2008. Relationship of serum antimüllerian hormone concentration to age at menopause. J Clin Endocrinol Metab 93:2129–2134 [PubMed] [Google Scholar]
11. Schnatz PF, Jiang X. 2011. Predicting age of menopause: what is the future of the antimüllerian hormone biomarker? Menopause 18:727–729 [PubMed] [Google Scholar]
12. Tehrani FR, Shakeri N, Solaymani-Dodaran M, Azizi F. 2011. Predicting age at menopause from serum antimüllerian hormone concentration. Menopause 18:766–770 [PubMed] [Google Scholar]
13. Broer SL, Eijkemans MJ, Scheffer GJ, van Rooij IA, de Vet A, Themmen AP, Laven JS, de Jong FH, Te Velde ER, Fauser BC, Broekmans FJ. 2011. Anti-mullerian hormone predicts menopause: a long-term follow-up study in normoovulatory women. J Clin Endocrinol Metab 96:2532–2539 [PubMedGoogle Scholar]
14. Plante BJ, Cooper GS, Baird DD, Steiner AZ. 2010. The impact of smoking on antimüllerian hormone levels in women aged 38 to 50 years. Menopause 17:571–576 [PMC free article] [PubMed] [Google Scholar]
15. Steiner AZ, Stanczyk FZ, Patel S, Edelman A. 2010. Antimullerian hormone and obesity: insights in oral contraceptive users. Contraception 81:245–248 [PMC free article] [PubMed] [Google Scholar
16. Seifer DB, Baker VL, Leader B. Age-specific serum anti-Mullerian hormone values for 17,120 women presenting to fertility centers within the United States. Fertil Steril. 2011; 95(2): 747-750.
17. Alireza Raeissi, M.Sc.1, Alireza Torki, M.Sc.1, Ali Moradi, Ph.D.1*, Seyed Mehdi Mousavipoor, M.Sc.2, Masoud Doosti Pirani, M.Sc. Age-Specific Serum Anti-Mullerian Hormone and Follicle Stimulating Hormone Concentrations inInfertile Iranian Women, Int J Fertil Steril, Vol 9, No 1, Apr-Jun 2015;32.
18. Seifer DB, MacLaughlin DT, Christian BP, Feng B, Shelden RM. Early follicular serum mullerian-inhibiting substance levels are associated with ovarian response during assisted reproductive technology cycles. Fertil Steril. 2002;77(3) : 468-471.
19. Maslow, Bat-Sheva L. MD, MSCTR; Guarnaccia, Michael MPH, MD; Hennessy, Dayna MSN, NP-C; Klein, Joshua U. MD; Age-Based Interpretation of Anti-Mullerian Hormone (AMH) Levels in Non-infertile Women [37J]Obstetrics & Gynecology: May 2019 - Volume 133 - Issue - p 117S-118S