Antral Follicle Count and AMH Level for Ovarian Reserve Comparison

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Abstract
Background: The chronological age at which menopause happens is evocative that reproductive aging is flexible amongst females, and shows that age is not a lone factor indicating the females’ reproductive potential. Various tests have been used to determine ovarian reserve, they are primarily used in Infertility clinics. Endocrine markers like anti-Mullerian hormone, estrogen and follicle stimulating hormone and inhibin B indirectly specify the increasing follicle count. The aim of the present study was to compare the antral follicle count and AMH level for ovarian reserve.

Materials and Methods: The present study was conducted in the department of gynecology for a period of 1 year. Plasma was separated and frozen at -70 degree Celsius. The demographic details of all the subjects was recorded in the forms. All the subjects were asked about age at menarche. The level of AMH was estimated in ng/ml. Student t test was used as a test of significance and probability value of less than 0.05 was considered as significant.

Results: The study involved 57 females with the mean age between 35.78 +/- 5.32 years. The median age of the subjects was 34 years with the range between 28-39 years. Between 20-25 years of age, the mean antral follicle count was 15.6 +/- 4.1. Between 26-30 years of age, the mean antral follicle count was 14.5 +/- 4.9. The level of AMH amongst subjects who smoked was 1.8 (0.8 - 3.5) and those who didn’t smoke was 2.2 (1.2 – 3.2). The level of AMH amongst subjects who consumed alcohol was 2.2 (1.0 – 3.3) and those who didn’t was 1.7 (1.2 – 3.2).

Conclusion: From the above study, we can conclude that levels of AMH and AFC significantly correlate with reproductive age.

Keywords: Antral follicle, Infertility, Mullerian.

Introduction
Reproductive aging in females is determined by ovarian aging and expressed as a decrease in both the quantity and quality of ovarian follicles.1 Peak fertility age amongst the females is during the mid-20s, after which the fertility starts to decay until menopause.2,3 The chronological age at which menopause happens is evocative that reproductive aging is flexible amongst females, and shows that age is not a lone factor indicating the females’ reproductive potential.4 The decline in follicle number was initially regarded biphasic with a sudden decline in number at 37 years of age5, but subsequent studies suggested that there
is gradual loss over time. Various tests have been used to determine ovarian reserve, they are primarily used in infertility clinics. Endocrine markers like anti-Mullerian hormone, estrogen and follicle stimulating hormone and inhibit B indirectly specify the increasing follicle count, ultrasound can be used to directly estimate the follicle count. Females with trisomic pregnancy have shown early onset of menopause. Various studies suggests that circulating anti-Mullerian hormone concentrations are highly linked with the number of antral follicles and are more strongly connected to ovarian reserve as compared to the clinical markers like follicle-stimulating hormone (FSH), inhibit B and estradiol. It is also known as Mullerian inhibiting substance and it is a fellow of the transforming growth factor-b family. It is seen in both the sexes at different phases of development and it is best remembered for its part in fetal sex differentiation. The aim of the present study was to compare the antral follicle count and AMH level for ovarian reserve.

**Materials and Methods**

The present study was conducted in the department of gynecology for a period of 1 year. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. The subjects with first stimulation of ovary treatment, both ovaries visible on ultrasound, no previous hormone replacement therapy, no autoimmune disease, no past ovarian surgery and no history of radiation therapy were included in the study. Blood samples were drawn and stored in lithium heparin tubes. Plasma was separated and frozen at -70 degree Celsius. The demographic details of all the subjects was recorded in the forms. All the subjects were asked about age at menarche. The level of AMH was estimated in ng/ml. The subjects were divided as smokers and non-smokers, alcoholics and non-alcoholics and were also divided per the gravidae. The figure of years meanwhile menarche was obtained by subtracting age with age at menarche. Gravidity encompassed any spontaneous pregnancy by the woman irrespective of the outcome of the same. All the data was arranged in a tabulated form and analyzed using SPSS software. Student t test was used as a test of significance and probability value of less than 0.05 was considered as significant.

**Results**

The study involved 57 females with the mean age between 35.78 +/- 5.32 years. Table 1 shows the characteristics of the study population. The median age of the subjects was 34 years with the range between 28-39 years. The median antral follicle count was 10 with the range of 8-16. The median age at menarche was 12 years with the range between 11-15 years. The median level of AMH was 1.9 ng/ml with the range between 1.2-3.3 ng/ml.

Table 2 shows the descriptive values of antral follicle count. Between 20-25 years of age, the mean antral follicle count was 15.6+/-4.1. Between 26-30 years of age, the mean antral follicle count was 14.5+/- 4.9. Between 31-35 years of age, the mean antral follicle count was 11.1+/-3.3. Between 36-40 years of age, the mean antral follicle count was 10.3+/- 3.6.

Table 3 shows the association between ovarian reserve markers and lifestyle. The level of AMH amongst subjects who smoked was 1.8 (0.8–3.5) and those who didn’t smoke was 2.2 (1.2–3.2). The level of AMH amongst subjects who consumed alcohol was 2.2 (1.0–3.3) and those who didn’t was 1.7 (1.2–3.2). There was no significant difference amongst the smokers and non-smokers. The AFC amongst the smokers and alcohol intake subjects was 9 (6–20) and 10 (8–16) respectively. The AFC count amongst primigravidae is 11 (6–13) and multigravidae is 10 (9–14). There was no significant difference in the AFC count amongst gravidae index.

**Table 1: Characteristics of study population**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>34</td>
<td>28-39</td>
</tr>
<tr>
<td>Antral follicle count</td>
<td>10</td>
<td>8-16</td>
</tr>
<tr>
<td>Age at menarche (years)</td>
<td>12</td>
<td>11-15</td>
</tr>
<tr>
<td>AMH (ng/ml)</td>
<td>1.9</td>
<td>1.2-3.3</td>
</tr>
</tbody>
</table>
serum AMH indicate the size of the primordial follicles present in ovary indirectly and show limited cycle variation during the intra and inter cycle period. The ultrasonic estimation of antral follicle count during the early follicular phase is directly related to ovarian reserve and its decline should be considered as the sign of ovarian aging. In our study, the level of AMH amongst subjects who smoked was 1.8 (0.8–3.5) and those who didn’t smoke was 2.2 (1.2–3.2). The level of AMH amongst subjects who consumed alcohol was 2.2 (1.0–3.3) and those who didn’t was 1.7 (1.2–3.2). There was no significant difference amongst the smokers and non-smokers. The AFC amongst the smokers and alcohol intake subjects was 9 (6–20) and 10 (8–16) respectively. The AFC count amongst primigravidae is 11 (6–13) and multigravidae is 10 (9–14). There was no significant difference in the AFC count amongst primigravidae is 11 (6–13) and multigravidae is 10 (9–14).

**Discussion**

Ovarian reserve tests play a critical role in the management of assisted reproductive techniques related to the estimation of poor or elevated ovarian response, disputing the controlled ovarian increased stimulation decorum and dosing of gonadotropin level to estimate the optimal frequency of oocyte. They are also used as marker to define polycystic ovarian syndrome, but the optimal level and the type of marker that should be regarded is not exactly clear. The expected age of menopause can now be predicted using the various ovarian reserve estimation tests, even in with wide interval of confidence. Recently, ovarian reserve screening amongst the general population has been contraindicated under the ethical concerns pertaining to planning reproductive life of women. Variety of hormonal and ultrasonic markers have been studied for ovarian reserve estimation amongst females with a poor response to ovulation induction during the anti-retroviral therapy. Markers like antral follicle estimation have found to be more valuable than markers previously studies like follicular stimulating hormone level and levels of follicular phase inhibin B. In our study, between 20-25 years of age, the mean antral follicle count was 15.6+/4.1. Between 26-30 years of age, the mean antral follicle count was 14.5+/4.9. Between 31-35 years of age, the mean antral follicle count was 11.1+/3.3. Between 36-40 years of age, the mean antral follicle count was 10.3+/3.6.

**Table 2: Antral follicle count descriptive values.**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Mean+/ SD</th>
<th>Minimum-Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>15.6+/4.1</td>
<td>5-25</td>
</tr>
<tr>
<td>26-30</td>
<td>14.5+/4.9</td>
<td>4-30</td>
</tr>
<tr>
<td>31-35</td>
<td>11.1+/3.3</td>
<td>3-11</td>
</tr>
<tr>
<td>36-40</td>
<td>10.3+/3.6</td>
<td>2-33</td>
</tr>
</tbody>
</table>

**Table 3: Association between ovarian reserve markers and lifestyle**

<table>
<thead>
<tr>
<th>Lifestyle factors</th>
<th>AMH</th>
<th>AFC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (range)</td>
<td>P value</td>
</tr>
<tr>
<td>Smoking</td>
<td>Yes 1.8 (0.8–3.5)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>No 2.2 (1.2–3.2)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Yes 2.2 (1.0–3.3)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>No 1.7 (1.2–3.2)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Gravidae</td>
<td>0 2.2 (1.2–3.7)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>&gt;/=1 1.5 (0.8–2.9)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

**Conclusion**

From the above study, we can conclude that levels of AMH and AFC significantly correlate with reproductive age. This study concluded that both AMH and AFC are equally efficacious in predicting the level of ovarian follicle reserve. However, smoking, alcohol intake and gravidae do no significantly alter the AFC and AMH level. With advancing age decline, has been observed in the antral follicle count.

Dr Shrikant Adsul et al JMSCR Volume 06 Issue 07 July 2018
References
