



Original Article

## A Study on Pregnancy Outcomes Following Oral and Injectable Ovulation Induction in Infertile Women with Low Anti-Müllerian Hormone Levels Compared to Infertile Women with Normal Anti-Müllerian Hormone Levels

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### ABSTRACT

**Background:** Anti-Müllerian Hormone (AMH) is a sensitive and reliable biomarker of ovarian reserve that predicts ovarian response to ovulation induction. Women with diminished ovarian reserve generally exhibit reduced follicular recruitment, lower ovulation rates, and poorer pregnancy outcomes compared with women having normal ovarian reserve. Assessment of AMH facilitates individualized infertility management and improves prognostic counselling.

**Objectives:** To compare pregnancy outcomes following oral and injectable ovulation induction in infertile women with **low AMH levels (<2.5 ng/mL)** and infertile women with **normal AMH levels (2.5–4.0 ng/mL)**.

**Materials and Methods:** This prospective comparative observational study was conducted in the Department of Obstetrics and Gynaecology, ESIC Medical College, Kalaburagi, from **October 2022 to September 2023**. A total of **150 infertile women** were enrolled and categorized into two groups according to serum AMH levels: **Low AMH group (AMH <2.5 ng/mL; n=75)** and **Normal AMH group (AMH 2.5–4.0 ng/mL; n=75)**. Participants underwent ovulation induction using oral agents (letrozole or clomiphene citrate) and/or injectable gonadotropins based on clinical indications. Serial transvaginal ultrasonography was performed for follicular monitoring. Ovarian response, ovulation rate, endometrial thickness, gonadotropin requirement, clinical pregnancy, live birth, and treatment-related complications were compared between the two groups. Statistical analysis was performed using IBM SPSS Statistics version 26.0, with a p-value <0.05 considered statistically significant.

**Results:** The mean age was significantly higher in the low AMH group than in the normal AMH group ( $33.4 \pm 3.2$  vs.  $28.9 \pm 3.8$  years;  $p<0.001$ ). Women with low AMH had significantly lower antral follicle counts, required higher doses of gonadotropins, and developed fewer mature follicles. The ovulation rate was **74.7%** in the low AMH group compared with **92.0%** in the normal AMH group ( $p=0.005$ ). Clinical pregnancy rates were significantly higher among women with normal AMH (**30.7%**) than among women with low AMH (**17.3%**,  $p=0.048$ ). Live birth rates were **26.7%** in the normal AMH group and **13.3%** in the low AMH group. Mild ovarian hyperstimulation syndrome was infrequent, and no severe complications were observed.

**Conclusion:** Infertile women with **normal AMH levels (2.5–4.0 ng/mL)** demonstrated significantly better ovarian response, higher ovulation rates, improved clinical pregnancy rates, and superior live birth outcomes following ovulation induction compared with women having **low AMH levels (<2.5 ng/mL)**. Serum AMH is an effective prognostic marker for individualized ovulation induction protocols, prediction of treatment response, and counselling of infertile couples.

## INTRODUCTION

Infertility is a significant global health problem affecting approximately 10–15% of couples of reproductive age and has profound medical, psychological, social, and economic consequences. The World Health Organization (WHO) defines infertility as the failure to achieve pregnancy after 12 months or more of regular unprotected sexual intercourse. Female factors contribute to nearly one-third of infertility cases, with diminished ovarian reserve becoming an increasingly common cause due to delayed childbearing and advancing maternal age (1).

Assessment of ovarian reserve is an essential component of infertility evaluation because it predicts ovarian responsiveness to stimulation and assists in selecting appropriate treatment strategies. Various ovarian reserve tests have been used in clinical practice, including basal follicle-stimulating hormone (FSH), estradiol, inhibin-B, antral follicle count (AFC), and Anti-Müllerian Hormone (AMH). Among these, AMH has emerged as the most reliable biomarker because of its minimal inter- and intra-cycle variability and strong correlation with the quantity of the remaining follicular pool (2,3).

Anti-Müllerian Hormone is a glycoprotein secreted by granulosa cells of pre-antral and small antral follicles. Serum AMH reflects the functional ovarian reserve and gradually declines with advancing age until becoming undetectable after menopause. Unlike other ovarian reserve markers, AMH can be measured at any stage of the menstrual cycle, making it a convenient and reproducible indicator of ovarian reserve (4).

Women with diminished ovarian reserve generally exhibit reduced follicular recruitment, poor ovarian response to stimulation, fewer mature follicles, increased gonadotropin requirements, and lower pregnancy rates following fertility treatment. Consequently, serum AMH has become an important prognostic marker for counselling infertile couples regarding expected treatment outcomes and selecting individualized ovulation induction protocols (5,6).

Ovulation induction remains one of the most frequently employed first-line treatments for anovulatory and unexplained infertility. Oral ovulation induction agents such as clomiphene citrate and letrozole are widely used because of their efficacy, ease of administration, and affordability. Injectable gonadotropins, including recombinant follicle-stimulating hormone (rFSH) and human menopausal gonadotropin (HMG), are reserved for women who demonstrate poor response to oral agents or require more intensive ovarian stimulation (7).

Several studies have demonstrated that women with normal AMH levels have better ovarian response, higher ovulation rates, improved endometrial development, and significantly higher pregnancy and live birth rates than women with diminished ovarian reserve. However, successful pregnancies can still occur in women with low AMH, indicating that AMH predicts ovarian response more accurately than absolute fertility potential (8,9).

Although numerous studies have evaluated AMH in assisted reproductive technologies such as in vitro fertilization (IVF), comparatively fewer studies have assessed pregnancy outcomes following conventional oral and injectable ovulation induction in women with varying ovarian reserve. Such information is particularly relevant in developing countries where ovulation induction with or without intrauterine insemination remains the most commonly utilized infertility treatment (10).

The present prospective comparative observational study was therefore undertaken to compare pregnancy outcomes following oral and injectable ovulation induction in infertile women with low serum AMH (<2.5 ng/mL) and normal serum AMH (2.5–4.0 ng/mL). The study also evaluated ovarian response, ovulation rate, follicular development, gonadotropin requirement, and pregnancy outcomes to determine the prognostic significance of serum AMH in infertility management.

## MATERIALS AND METHODS

### Study Design

This prospective comparative observational study was conducted to evaluate pregnancy outcomes following oral and injectable ovulation induction in infertile women with low Anti-Müllerian Hormone (AMH) levels compared with infertile women having normal AMH levels.

### Study Setting

The study was conducted in the Department of Obstetrics and Gynaecology (Reproductive Medicine and Infertility Unit), ESIC Medical College, Kalaburagi, Karnataka, India, over a period of one year, from October 2022 to September 2023.

Institutional Ethics Committee approval was obtained before commencement of the study, and written informed consent was obtained from all participants.

### Study Population

A total of 150 infertile women attending the infertility outpatient department during the study period and fulfilling the eligibility criteria were enrolled consecutively.

Participants were divided into two groups according to serum Anti-Müllerian Hormone (AMH) levels:

- **Group A (Low AMH Group):** 75 infertile women with **serum AMH <2.5 ng/mL**.
- **Group B (Normal AMH Group):** 75 infertile women with **serum AMH 2.5–4.0 ng/mL**.

Both primary and secondary infertility cases were included.

### Objectives

#### Primary Objective

- To compare pregnancy outcomes following oral and injectable ovulation induction in infertile women with low AMH levels and those with normal AMH levels.

#### Secondary Objectives

- To compare ovarian response to ovulation induction.
- To compare ovulation rates between the two groups.
- To compare follicular development.
- To compare endometrial thickness at ovulation trigger.
- To evaluate biochemical pregnancy, clinical pregnancy, ongoing pregnancy, and live birth rates.
- To assess treatment-related complications including ovarian hyperstimulation syndrome (OHSS).

### Sample Size

The study comprised 150 infertile women, with 75 women in each study group.

### Inclusion Criteria

Women fulfilling all the following criteria were included:

- Age between 20 and 40 years.
- Primary or secondary infertility of at least one year's duration.
- Regular menstrual cycles (24–35 days).
- At least one patent fallopian tube confirmed by hysterosalpingography (HSG) or diagnostic laparoscopy.
- Male partner with normal semen parameters according to WHO 2021 criteria or adequately treated mild male-factor infertility.
- Serum AMH estimation available before initiation of treatment.
- Candidates planned for ovulation induction with timed intercourse or intrauterine insemination (IUI).
- Willingness to participate and provide written informed consent.

### Exclusion Criteria

Women with any of the following were excluded:

- Bilateral tubal block.
- Severe male-factor infertility requiring IVF/ICSI.
- Premature ovarian insufficiency.
- Polycystic ovary syndrome (PCOS).
- Stage III or IV endometriosis.
- Congenital uterine anomalies.
- Submucous fibroids affecting the uterine cavity.
- Uncontrolled thyroid dysfunction.
- Hyperprolactinaemia.
- Uncontrolled diabetes mellitus.
- Active pelvic inflammatory disease.
- Previous ovarian surgery.
- Women undergoing assisted reproductive techniques (IVF/ICSI).

### Clinical Evaluation

Detailed clinical evaluation included:

- Maternal age.

- Body Mass Index (BMI).
- Duration and type of infertility.
- Menstrual history.
- Previous infertility treatment.
- Obstetric history.
- Medical and surgical history.

General physical, systemic, and pelvic examinations were performed in all participants.

### Baseline Investigations

All participants underwent the following investigations during the early follicular phase (Day 2–5):

- Complete Blood Count (CBC).
- Blood grouping and Rh typing.
- Thyroid Stimulating Hormone (TSH).
- Serum Prolactin.
- Follicle Stimulating Hormone (FSH).
- Luteinizing Hormone (LH).
- Serum Estradiol (E2).
- Serum Anti-Müllerian Hormone (AMH).
- Blood glucose profile.
- Viral markers (HIV, HBsAg, HCV).
- Semen analysis of the male partner according to WHO 2021 guidelines.
- Hysterosalpingography (HSG) or diagnostic laparoscopy for tubal patency.
- Baseline transvaginal ultrasonography (TVS) for assessment of Antral Follicle Count (AFC).

### Serum AMH Estimation

Serum AMH concentration was measured before initiation of ovarian stimulation using a standardized automated **Chemiluminescent Immunoassay (CLIA)**.

Women were categorized as:

- **Low ovarian reserve:** Serum AMH <2.5 ng/mL.
- **Normal ovarian reserve:** Serum AMH 2.5–4.0 ng/mL.

### Ovulation Induction Protocol

Ovulation induction was started on **Day 2 or Day 3** of the menstrual cycle.

### Oral Ovulation Induction

Women received one of the following according to clinical indication:

- Letrozole **2.5–5 mg/day** orally from Day 3 to Day 7.

or

- Clomiphene citrate **50–100 mg/day** orally from Day 3 to Day 7.

### Injectable Ovulation Induction

Women with diminished ovarian reserve or inadequate response to oral agents received injectable gonadotropins.

The stimulation protocol included:

- Recombinant Follicle Stimulating Hormone (rFSH), or
- Human Menopausal Gonadotropin (HMG).

The initial dose ranged from **75 IU to 150 IU/day** and was individualized according to maternal age, BMI, AMH level, baseline AFC, and previous ovarian response. Dose modifications were made based on serial ultrasonographic monitoring.

### Follicular Monitoring

Serial transvaginal ultrasonography was performed from **Day 9** of the stimulation cycle.

The following parameters were recorded:

- Number of developing follicles.
- Diameter of the dominant follicle.
- Endometrial thickness.
- Endometrial pattern.

Monitoring was continued every **1–2 days** until ovulation trigger.

### Ovulation Trigger

When at least one dominant follicle measured **18–20 mm**, ovulation was triggered using either:

- Human Chorionic Gonadotropin (hCG) **10,000 IU intramuscularly**, or
- Recombinant hCG **250 µg subcutaneously**.

Timed intercourse or intrauterine insemination (IUI) was advised **34–36 hours** after ovulation trigger.

### Luteal Phase Support

Micronized progesterone **200–400 mg/day** was administered vaginally following ovulation and continued until pregnancy testing. Women with confirmed pregnancy continued progesterone supplementation up to **10–12 weeks of gestation**.

### Follow-up

Serum **β-hCG** estimation was performed **14 days** after ovulation trigger.

Clinical pregnancy was confirmed by transvaginal ultrasonography demonstrating:

- Intrauterine gestational sac.
- Fetal pole.
- Cardiac activity at **6–7 weeks** of gestation.

Pregnant women were followed until delivery to document:

- Biochemical pregnancy.
- Clinical pregnancy.
- Ongoing pregnancy.
- Miscarriage.
- Live birth.
- Ectopic pregnancy.

### Outcome Measures

#### Primary Outcome

- Clinical pregnancy rate.

#### Secondary Outcomes

- Ovulation rate.
- Number of mature follicles.
- Endometrial thickness.
- Total gonadotropin dose required.
- Cycle cancellation rate.
- Biochemical pregnancy rate.
- Ongoing pregnancy rate.
- Live birth rate.
- Miscarriage rate.
- Multiple pregnancy rate.
- Incidence of ovarian hyperstimulation syndrome (OHSS).

### Data Collection

The following variables were recorded:

- Age.
- BMI.
- Duration and type of infertility.
- Serum AMH level.
- Basal FSH.
- Antral Follicle Count.
- Type of ovulation induction.
- Total gonadotropin dose.
- Number of mature follicles.
- Endometrial thickness.
- Ovulation status.
- Pregnancy outcome.
- Live birth.

- Miscarriage.
- OHSS.
- Multiple pregnancy.

### Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of ESIC Medical College, Kalaburagi. Written informed consent was obtained from all participants before enrolment. Confidentiality of participant information was maintained throughout the study, and all procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

### Statistical Analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean  $\pm$  standard deviation (SD), while categorical variables were expressed as frequency and percentage. Comparisons between the two study groups were performed using the Independent Student's t-test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. Multivariate logistic regression analysis was performed to identify independent predictors of clinical pregnancy after adjusting for age, BMI, duration of infertility, Antral Follicle Count, and type of ovulation induction. A p-value  $<0.05$  was considered statistically significant.

## RESULTS AND OBSERVATIONS

A total of 150 infertile women undergoing ovulation induction were included in the study. Based on serum Anti-Müllerian Hormone (AMH) levels, 75 women with AMH  $<2.5$  ng/mL were categorized into the Low AMH group (Group A) and 75 women with AMH 2.5–4.0 ng/mL into the Normal AMH group (Group B). Baseline characteristics, ovarian reserve parameters, ovarian response, ovulation outcomes, pregnancy outcomes, and treatment-related complications were compared between the two groups.

**Table 1. Baseline Demographic Characteristics**

| Variable                 | Low AMH (n=75) | Normal AMH (n=75) | p-value  |
|--------------------------|----------------|-------------------|----------|
| Mean age (years)         | 33.4 $\pm$ 3.2 | 28.9 $\pm$ 3.8    | $<0.001$ |
| BMI (kg/m <sup>2</sup> ) | 24.8 $\pm$ 2.9 | 24.1 $\pm$ 2.6    | 0.214    |
| Primary infertility      | 49 (65.3%)     | 52 (69.3%)        | 0.598    |
| Secondary infertility    | 26 (34.7%)     | 23 (30.7%)        |          |

**Observation:** Women in the low AMH group were significantly older than those in the normal AMH group. BMI and type of infertility were comparable between the groups.

**Table 2. Duration of Infertility**

| Duration (Years)      | Low AMH (n=75) | Normal AMH (n=75) |
|-----------------------|----------------|-------------------|
| 1–3                   | 18 (24.0%)     | 36 (48.0%)        |
| 4–6                   | 35 (46.7%)     | 28 (37.3%)        |
| $>6$                  | 22 (29.3%)     | 11 (14.7%)        |
| Mean Duration (Years) | 5.2 $\pm$ 2.1  | 3.8 $\pm$ 1.7     |
| p-value               | 0.001          |                   |

**Observation:** The duration of infertility was significantly longer among women with low AMH levels.

**Table 3. Baseline Ovarian Reserve Parameters**

| Variable         | Low AMH         | Normal AMH      | p-value  |
|------------------|-----------------|-----------------|----------|
| AMH (ng/mL)      | 1.72 $\pm$ 0.46 | 3.21 $\pm$ 0.42 | $<0.001$ |
| Basal FSH (IU/L) | 9.8 $\pm$ 2.4   | 6.9 $\pm$ 1.7   | $<0.001$ |
| AFC              | 5.8 $\pm$ 1.6   | 12.6 $\pm$ 2.8  | $<0.001$ |

**Observation:** Women with low AMH had significantly lower ovarian reserve, lower AFC, and significantly higher basal FSH levels.

**Table 4. Type of Ovulation Induction**

| Ovulation Induction Method | Low AMH (n=75) | Normal AMH (n=75) | p-value |
|----------------------------|----------------|-------------------|---------|
| Oral agents only           | 28 (37.3%)     | 46 (61.3%)        |         |
| Injectable gonadotropins   | 47 (62.7%)     | 29 (38.7%)        | 0.003   |

**Observation:** Women with low AMH required injectable gonadotropins significantly more frequently than women with normal AMH.

**Table 5. Ovarian Response Following Ovulation Induction**

| Variable                     | Low AMH    | Normal AMH | p-value |
|------------------------------|------------|------------|---------|
| Mature follicles             | 1.4 ± 0.6  | 2.3 ± 0.8  | <0.001  |
| Endometrial thickness (mm)   | 8.4 ± 1.2  | 9.1 ± 1.1  | 0.002   |
| Total gonadotropin dose (IU) | 1225 ± 286 | 875 ± 245  | <0.001  |

**Observation:** Women with normal AMH demonstrated significantly better follicular response, thicker endometrium, and required significantly lower gonadotropin doses.

**Table 6. Ovulation Outcomes**

| Outcome              | Low AMH (n=75) | Normal AMH (n=75) | p-value |
|----------------------|----------------|-------------------|---------|
| Successful ovulation | 56 (74.7%)     | 69 (92.0%)        | 0.005   |
| Cycle cancellation   | 9 (12.0%)      | 3 (4.0%)          | 0.071   |
| Anovulatory cycle    | 10 (13.3%)     | 3 (4.0%)          |         |

**Observation:** Ovulation was achieved significantly more frequently among women with normal AMH, whereas cycle cancellation was more common in the low AMH group.

**Table 7. Pregnancy Outcomes**

| Outcome               | Low AMH (n=75) | Normal AMH (n=75) | p-value |
|-----------------------|----------------|-------------------|---------|
| Biochemical pregnancy | 16 (21.3%)     | 26 (34.7%)        |         |
| Clinical pregnancy    | 13 (17.3%)     | 23 (30.7%)        | 0.048   |
| Ongoing pregnancy     | 11 (14.7%)     | 21 (28.0%)        | 0.041   |

**Observation:** Clinical and ongoing pregnancy rates were significantly higher in women with normal AMH than in women with low AMH.

**Table 8. Pregnancy Outcome Among Clinical Pregnancies**

| Outcome           | Low AMH (n=13) | Normal AMH (n=23) |
|-------------------|----------------|-------------------|
| Live birth        | 10 (76.9%)     | 20 (87.0%)        |
| Miscarriage       | 3 (23.1%)      | 2 (8.7%)          |
| Ectopic pregnancy | 0              | 1 (4.3%)          |

**Observation:** Women with normal AMH had higher live birth rates and fewer miscarriages than women with low AMH.

**Table 9. Treatment-Related Complications**

| Complication                 | Low AMH (n=75) | Normal AMH (n=75) | p-value |
|------------------------------|----------------|-------------------|---------|
| Mild OHSS                    | 1 (1.3%)       | 5 (6.7%)          |         |
| Multiple pregnancy           | 0              | 3 (4.0%)          |         |
| Drug-related adverse effects | 4 (5.3%)       | 6 (8.0%)          | 0.284   |

**Observation:** Treatment-related complications were uncommon in both groups. Mild OHSS and multiple pregnancies occurred more frequently among women with normal AMH owing to better ovarian responsiveness.

**Table 10. Overall Comparison of Treatment Outcomes**

| Outcome                 | Low AMH (n=75) | Normal AMH (n=75) | p-value |
|-------------------------|----------------|-------------------|---------|
| Ovulation rate          | 74.7%          | 92.0%             | 0.005   |
| Clinical pregnancy rate | 17.3%          | 30.7%             | 0.048   |
| Live birth rate         | 13.3%          | 26.7%             | 0.039   |
| Cycle cancellation rate | 12.0%          | 4.0%              | 0.071   |
| Miscarriage rate        | 4.0%           | 2.7%              | 0.648   |

**Observation:** Infertile women with **normal AMH levels (2.5–4.0 ng/mL)** demonstrated significantly better ovarian response, higher ovulation rates, improved clinical pregnancy and live birth rates, and lower cycle cancellation rates compared with women having **low AMH levels (<2.5 ng/mL)**. Women with low AMH required higher doses of gonadotropins and exhibited comparatively poorer reproductive outcomes, confirming the prognostic value of serum AMH in predicting response to ovulation induction and pregnancy success.

## DISCUSSION

The present prospective comparative observational study evaluated pregnancy outcomes following oral and injectable ovulation induction among infertile women with low and normal serum AMH levels. The findings demonstrated that women with **normal AMH levels (2.5–4.0 ng/mL)** had significantly better ovarian response, higher ovulation rates, greater clinical pregnancy rates, and superior live birth outcomes than women with **low AMH levels (<2.5 ng/mL)**.

In the present study, women with low AMH were significantly older than women with normal AMH ( $33.4 \pm 3.2$  vs.  $28.9 \pm 3.8$  years;  $p < 0.001$ ). This observation is expected because ovarian reserve progressively declines with advancing maternal age. Broer et al. demonstrated a strong inverse relationship between age and serum AMH concentration, confirming that AMH is one of the earliest biochemical markers of ovarian ageing (3).

The duration of infertility was significantly longer in women with low AMH levels than in women with normal ovarian reserve. Reduced ovarian reserve decreases the probability of spontaneous conception and often results in prolonged infertility. Similar observations have been reported by Fleming et al., who highlighted diminished ovarian reserve as an important determinant of delayed conception and poorer treatment outcomes (11).

Baseline ovarian reserve assessment revealed significantly lower AMH levels, lower antral follicle counts, and higher basal FSH concentrations in the low AMH group. These findings validate the physiological relationship between declining ovarian reserve and compensatory elevation of pituitary FSH. La Marca and Volpe reported that AMH and AFC are closely correlated and are superior predictors of ovarian reserve compared with conventional endocrine markers (4).

Women with low AMH required significantly higher doses of injectable gonadotropins for adequate follicular stimulation. Despite higher stimulation doses, they developed fewer mature follicles than women with normal AMH levels. Nelson et al. similarly observed that diminished ovarian reserve is associated with reduced ovarian responsiveness and increased gonadotropin requirements during controlled ovarian stimulation (12).

The ovulation rate in the present study was significantly higher among women with normal AMH (92.0%) compared with those having low AMH (74.7%). Better follicular recruitment and ovarian responsiveness among women with preserved ovarian reserve explain these findings. Comparable results have been reported by Tal and Seifer, who demonstrated that AMH is a strong predictor of ovarian response during ovulation induction (13).

Clinical pregnancy and ongoing pregnancy rates were significantly higher among women with normal AMH levels. The clinical pregnancy rate was 30.7% in the normal AMH group compared with 17.3% in the low AMH group. These findings are consistent with those reported by Sunkara et al., who observed significantly improved pregnancy and cumulative live birth rates among women with higher AMH concentrations undergoing fertility treatment (14).

Women with normal AMH also achieved higher live birth rates and experienced fewer miscarriages than women with diminished ovarian reserve. Although AMH primarily reflects follicular quantity rather than oocyte quality, lower AMH levels are commonly associated with advanced maternal age, which adversely affects embryo quality and reproductive outcomes. Dewailly et al. reported similar associations between ovarian reserve, maternal age, and pregnancy success (5).

Treatment-related complications were infrequent in both study groups. Mild ovarian hyperstimulation syndrome occurred more commonly among women with normal AMH because of greater ovarian responsiveness to gonadotropins, while no severe OHSS was observed. Individualized stimulation protocols based on ovarian reserve assessment probably contributed to the low complication rate. Similar findings have been reported in current infertility management guidelines (7,15).

The strengths of the present study include its prospective design, standardized hormonal assessment, serial ultrasonographic follicular monitoring, and comprehensive evaluation of ovarian response and pregnancy outcomes. However, the study was conducted at a single tertiary care centre with a relatively small sample size. Furthermore, treatment allocation was individualized rather than randomized, and oral as well as injectable ovulation induction protocols were analysed together. Larger multicentric randomized studies with longer follow-up are required to validate these findings.

Overall, the present study confirms that serum AMH is an excellent biomarker of ovarian reserve and a useful prognostic indicator for predicting ovarian response, ovulation, and pregnancy outcomes following ovulation induction. Assessment of AMH before initiating infertility treatment facilitates individualized stimulation protocols, realistic patient counselling, and optimization of reproductive outcomes.

## CONCLUSION

Serum Anti-Müllerian Hormone (AMH) is a valuable and reliable biomarker for assessing ovarian reserve and predicting ovarian response to ovulation induction in infertile women. In the present study, women with normal AMH levels (2.5–4.0 ng/mL) demonstrated significantly better ovarian response, higher ovulation rates, greater clinical pregnancy and live birth rates, and lower cycle cancellation rates compared with women having low AMH levels (<2.5 ng/mL). Women with low AMH required higher doses of gonadotropins and exhibited comparatively poorer reproductive outcomes.

Measurement of serum AMH before initiating ovulation induction facilitates individualized treatment planning, appropriate patient counselling, optimization of stimulation protocols, and realistic expectations regarding pregnancy outcomes. Routine assessment of AMH should therefore be incorporated into the evaluation of infertile women to improve clinical decision-making and reproductive success.

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