

# EFFECT OF FINAL SERUM ESTRADIOL AND PROGESTERONE LEVEL ON THE OUTCOME OF INTRACYTOPLASMIC SPERM INJECTION

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## Introduction

Infertility affects about 10–15% of couples worldwide. Assisted reproductive techniques, notably ICSI, have become essential in managing infertility. However, the role of late-follicular serum estradiol (E2) and progesterone (P4) levels and their ratio on ICSI outcomes remains debated.

## Aim of the work

This study aimed to assess the predictive value of trigger-day E2, P4, and P4/E2 ratio on oocyte maturity, embryo quality, and pregnancy rates in ICSI cycles.

## Patients and Methods

A prospective study was conducted on 410 infertile women (aged 20–38 years) undergoing ICSI at Alexandria IVF centers under a GnRH antagonist protocol. Serum E2 and P4 were measured on the hCG trigger day. Outcomes assessed included the number of oocytes retrieved, MII oocyte ratio, fertilization rate, good-quality embryo ratio, and clinical pregnancy rate, with statistical analysis evaluating correlations and predictors.

## Results

The mean patient age was 31 years. On average, 13 oocytes were retrieved per cycle with an 80% MII rate, a 76% fertilization rate, and a 65% good-quality embryo ratio. The clinical pregnancy rate was 45.6%. Patients achieving pregnancy had significantly higher good-quality embryo ratios. While E2, P4, and P4/E2 did not differ significantly between pregnant and non-pregnant groups, higher P4 and P4/E2 correlated positively with better embryo quality. The MII oocyte ratio was the strongest independent predictor of embryo quality.

Table (1): Relation between pregnancy rate and different parameters.

|                           | Pregnancy rate   |                  | U       | P value |
|---------------------------|------------------|------------------|---------|---------|
|                           | No               | Yes              |         |         |
| Ratio of M2               |                  |                  |         |         |
| Min.-Max.                 | 57.14-100        | 57.14-100        | 20436.0 | 0.728   |
| Mean± S.D                 | 79.81±13.502     | 80.26±12.710     |         |         |
| Fertilization rate        |                  |                  |         |         |
| Min.-Max.                 | 12.50-100        | 22.22-100        | 20701.0 | 0.900   |
| Mean± S.D                 | 75.89±20.207     | 76.89±17.749     |         |         |
| Good quality embryo ratio |                  |                  |         |         |
| Min.-Max.                 | 0.0-100          | 0.0-100          | 17896.0 | 0.013*  |
| Mean± S.D                 | 61.59±29.170     | 68.97±24.208     |         |         |
| P4                        |                  |                  |         |         |
| Min.-Max.                 | 0.11-1.84        | 0.05-183         | 19487.0 | 0.254   |
| Mean± S.D                 | 0.88±0.325       | 0.91±0.326       |         |         |
| E2                        |                  |                  |         |         |
| Min.-Max.                 | 209.4-6948.0     | 300.0-8077.0     | 18756.0 | 0.080   |
| Mean± S.D                 | 2288.16±1303.700 | 2419.58±1148.589 |         |         |
| P4/E2 ratio               |                  |                  |         |         |
| Min.-Max.                 | 0.002-0.66       | 0.001-0.42       | 20017.0 | 0.486   |
| Mean± S.D                 | 0.06±0.062       | 0.05±0.044       |         |         |

Table (2): Correlation between Good quality embryo ratio and other

|                    | Good quality embryo ratio |         |
|--------------------|---------------------------|---------|
|                    | Number                    | Percent |
| Ratio of M2        | 0.120                     | 0.015*  |
| Fertilization rate | -0.036                    | 0.473   |
| P4                 | 0.141                     | 0.004*  |
| E2                 | -0.054                    | 0.272   |
| P4/E2 ratio        | 0.131                     | 0.008*  |

## Conclusion

A balanced hormonal environment on trigger day is important for optimal ICSI outcomes. Moderate increases in P4 are associated with better embryo quality, while excessively high P4 may impair implantation. Monitoring trigger-day P4 and P4/E2 can guide fresh vs. freeze-all decisions to optimize outcomes. The MII oocyte ratio remains a key predictor of embryo quality and overall success in ICSI cycles.