# Uncovering the Impact of IGF-1 Levels on Growth Hormone Therapy Outcomes in IVF: A Sub-Study of a Randomized Controlled Trial

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## INTRODUCTION

- Growth hormone (GH) is a common treatment for female infertility, but its mechanism remains unclear[1].
- GH stimulates IGF-1, influencing key aspects of fertility[2,3].
- Insulin-like growth factor 1 (IGF-1) plays a vital role in follicle development, estrogen synthesis, and embryo implantation[4,5].
- While AMH predicts ovarian reserve, it is not necessarily an indicator of oocyte quality nor a predictor for pregnancy[6].
- Debate exists regarding IGF-1's direct impact on fertility, with mixed research findings.

## STUDY QUESTION

Does the effect of GH adjunctive therapy in in-vitro fertilization (IVF) depend on the patient's IGF-1 levels before treatment?

## OBJECTIVES

- To investigate the impact of insulin-like growth factor 1 (IGF-1) levels on the effectiveness of growth hormone adjunctive therapy in IVF.
- To determine the optimal cut-off value for IGF-1 levels.

## METHODS

- **Study design.** This is a sub-study in which recruitment occurred at the OVO clinic in Montreal between June 2014 and January 2020.
- **Participants.** A total of 288 patients were enrolled, and data from 283 patients were analyzed, with 258 patients assigned to either group based on their IGF-1 levels: **Group A (<100ng/ml)** or **Group B (≥100 ng/ml).**
- **Statistical Analysis.** Using a regression model and a receiving operating characteristic (ROC) analysis, we aimed to predict an optimal cut-off value for IGF-1 serum levels that maximizes sensitivity while minimizing false positives.

## RESULTS

**Correlation between IGF-1 and age:**

- No correlation was found between IGF-1 levels and age (Figure 1).

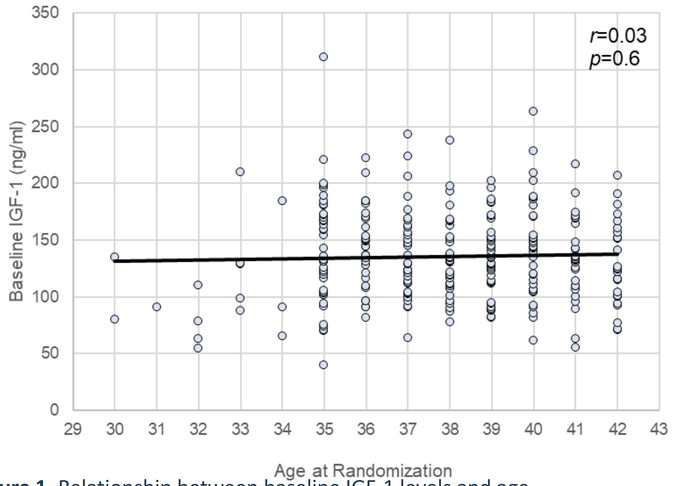


**Figure 1.** Relationship between baseline IGF-1 levels and age.

**Correlation between IGF-1 and AMH :**

- Negative correlation between IGF-1 levels and AMH levels (p=0.018).
- GH treatments in patients with AMH ≤1.1 ng/ml showed a lower clinical pregnancy rate of 22.2% than the control group, but a zero-miscarriage rate (compared to 33.3% in the control group, p=0.07) (Table 1).

**Table 1**. Effects of GH administration on various indicators of fertility based on baseline AMH levels.

| | AMH ≤1.1 ng/ml | | | AMH >1.1 ng/ml | | |
|---|---|---|---|---|---|---|
| | Control *n*=35 | Experimental *n*=36 | *p*-value | Control *n*=94 | Experimental *n*=93 | *p*-value |
| **Mature oocytes** | 4.9 ± 2.9 | 5.1 ± 2.8 | 0.80 | 10.0 ± 6.7 | 9.7 ± 6.5 | 0.75 |
| **Clinical pregnancies (%)** | 15 (42.8) | 8 (22.2) | 0.05 | 49 (52.1) | 43 (46.2) | 0.51 |
| **Live births (%)** | 9 (25.7) | 8 (22.2) | 0.69 | 42 (44.7) | 37 (39.8) | 0.55 |
| **Miscarriages (%)** | 5 (33.3) | 0 (0.0) | 0.07 | 7 (13.7) | 4 (9.3) | 0.54 |

## RESULTS (cont.)

**Clinical pregnancy rates:**

Group A (IGF-1 <100 ng/ml):

- Increased mature oocytes with GH (11.09 vs. 9.84, p=0.46)
- No significant differences in clinical pregnancy (63.6% vs. 52%), live birth rate (54.5% vs. 40%), or miscarriage rate (7.1% vs. 23.1%).

Group B (IGF-1 ≥100 ng/ml):

- Significant decrease in clinical pregnancy rate with GH (34.5% vs. 51.0%; p=0.018) (Figure 2).

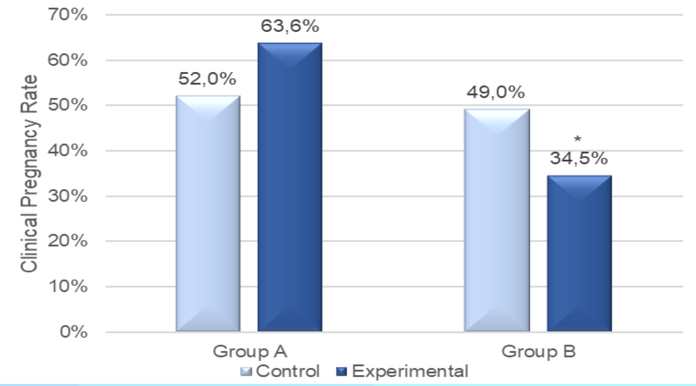


**Figure 2.** Effects of GH administration on various indicators of fertility based on baseline IGF-1 levels.

## CONCLUSION

GH supplementation provides benefits for IVF outcomes in patients with low baseline IGF-1 levels (<100 ng/ml), but it can have a negative impact on those with high baseline IGF-1 levels.

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