

Personalizing IVF Stimulation: The Effect of BMI on Serum FSH Levels and Gonadotropin Requirements

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Introduction

Exogenous FSH is administered during ovarian stimulation to promote multifollicular growth by binding to FSH receptors on granulosa cells, thereby enhancing folliculogenesis and increasing the yield of mature metaphase II oocytes for IVF. Recent ESHRE guidelines recommend not to exceed 300 IU for ovarian stimulation. We evaluated here how the BMI influence serum FSH levels during ovarian stimulation, and how serum FSH changes from baseline to GnRH-antagonist day initiation could predict the outcome?

Material and Method

A retrospective analysis was conducted on 1,502 IVF cycles performed. The analysis included only cycles with a documented endocrine profile at the start of stimulation, utilizing a GnRH-antagonist protocol, and resulting in oocyte retrieval. Analysis included women undergoing IVF in a GnRH-antagonist protocol, grouped by BMI and starting gonadotropin dose. Multivariable regression analysis was conducted to evaluate the associations between serum FSH fluctuations and BMI categories (<25, 25-30, >30 kg/m²), initial gonadotropin doses (300, 375, 450 IU) of recFSH or HMG, and clinical outcomes. Serum FSH measurements were taken at baseline and antagonist initiation day.

Results

Higher BMI was associated with lower serum FSH increases from baseline to antagonist initiation in a dose-dependent manner: BMI 25-30 ($\beta=-0.50$, 95% CI: -0.59 to -0.40, $p<0.001$) and BMI >30 ($\beta=-0.85$, 95% CI: -0.95 to -0.75, $p<0.001$). Moreover, older female age ($\beta=-0.07$, 95% CI: -0.12 to -0.03, $p<0.001$) and basal AFC count ($\beta=-0.08$, 95% CI: -0.14 to -0.03, $p<0.001$) also were associated with lower FSH increases. Higher starting doses produced greater FSH increases (375IU: $\beta=0.60$, $p<0.001$; 450IU: $\beta=1.05$, $p<0.001$). Notably, after adjusting for AMH and basal AFC, FSH increase from basal to antagonist day significantly predicted MII oocyte yield in the 300IU group (IRR=1.07, 95% CI: 1.01-1.14, $p=0.030$), with reduced effect at starting dose of 375IU and no significant association at 450IU.

Conclusion

These findings suggest that higher BMI reduces serum FSH levels during stimulation, requiring personalized gonadotropin dosing for optimal response and IVF success. ESHRE guidelines on maximum FSH dosing (**300 IU**) should be revised to consider systemic FSH levels rather than the administered dose.

Fig 1.

