HIGHER RATIO OF EXOGENOUS LUTEINIZING HORMONE (LH) TO FOLLICLE STIMULATING HORMONE (FSH) ACTIVITY IS ASSOCIATED WITH INCREASED FINAL BLASTOCYST COUNTS IN ANTAGONIST PROTOCOL

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BACKGROUND

- IVF protocols often utilize both recombinant FSH (rFSH) and human menopausal gonadotropins (hMG) with both FSH and LH activity
- The ideal ratio of LH to FSH activity in gonadotropin releasing hormone antagonist (GnRHant) IVF protocols is unknown

OBJECTIVE

To investigate if there is an association between LH:FSH ratio in IVF outcomes

STUDY DESIGN

- Retrospective single center chart review of first IVF cycle of women who underwent GnRHant protocol from Oct 2023 - July 2025
- Exclusion criteria:
  - Oocyte preservation/donation cycles
  - Severe male factor (TMS < 1 M or surgically extracted sperm)
  - Use of oral ovulation induction medication
- LH:FSH ratio was ((total hMG) ÷ (total rFSH + total hMG))
- Primary outcome: # of blastocysts frozen (day 5-7 embryos with expansion grade ≥ 3 and inner cell mass and trophectoderm quality grade A or B)
- Secondary Outcome: total & mature oocytes, fertilization rate, and euploidy rate
- Two-group comparisons performed using Mann-Whitney test using LH:FSH ≤ 0.33 (median) as the discrimination point
- Multivariable linear regression performed to control for age, body mass index (BMI), anti-mullerian hormone level (AMH), and estradiol (E2) level at time of trigger

RESULTS

OVERALL DEMOGRAPHICS	
TOTAL PATIENTS	241
Age	35 (23-44)
BMI	28.25 kg/m² (18-46)
AMH	2.81 ng/mL (0-27.9)
E2 Level at Trigger	2796 pg/mL (273 – 8423)
LH:FSH	14.5 (0-41)

Table 1: Baseline Demographics

Mann Whitney Two Group Comparison			
Variable	**LH:FSH ≤ 0.33 (range) (n=154)**	**LH:FSH > 0.33 (range) (n=86)**	**P-Value**
Age	35 (23-44)	34 (26-42)	0.26
BMI	28.25 kg/m² (18-46)	27.81 kg/m² (18-45)	0.99
AMH	2.81 ng/mL (0-27.9)	5.25 ng/mL (0.01-35.5)	**<0.0001**
E2 Level at Trigger	2796 pg/mL (273 – 8423)	3463 pg/mL (93-8946)	**0.017**
# of oocytes	14.5 (0-41)	18.0 (3-44)	**0.002**
# of mature oocytes	10.0 (0-36)	13.5 (0-39)	**0.001**
Fertilization Rate	83% (0-100%)	82% (0-100%)	0.47
# of blastocysts frozen	3 (0-14)	5 (0-14)	**0.001**
Euploidy Rate Among PGT cycles (n)	50% (0-100%) (n=85)	60% (0-100%) (n=43)	0.18

Table 2: Statistically higher number of total oocytes, mature oocytes, and blastocysts frozen when comparing LH:FSH > 0.33 vs, LH:FSH ≤ 0.33

Multi-Linear Regression for Total Blastocysts Frozen				
Variable	**Estimate**	**95% CI**	**|t|**	**P Value**
Intercept	7.571	3.701 to 11.4	3.853	0.0001
Age	-0.2076	-0.2946 to-0.1205	4.698	<0.0001
BMI	0.002304	-0.05008 to 0.05469	0.087	0.9310
AMH	0.05605	-0.02486 to 0.1369	1.364	0.1737
LH/FSH	6.396	2.204 to 10.59	3.005	0.0029
E2 at Trigger	0.0004394	0.0002 to 0.0007	3.628	0.0003

Table 3: However, only the difference in total number of blastocysts (not total oocytes or mature oocytes) persisted after controlling for age, AMH, and BMI using a multi linear regression

DISCUSSION

- Higher LH:FSH ratios are associated with an increased total of good quality blastocysts even while accounting for age, BMI, and AMH
- However, higher LH:FSH ratios were not associated with total number of oocytes retrieved, mature oocytes, fertilization rate, or euploidy rate
- This may indicate a role of LH:FSH in cytoplasmic maturity of the oocyte
- Limitations include:
  - Restricted to GnRH antagonist protocol only
  - Retrospective chart review design
  - Did not account for infertility diagnosis
- If verified by larger trials, this study could impact recommendations for stimulation protocols, perhaps even extending to oocyte freezing cycles.

CONCLUSION

In GnRHant cycles, higher LH:FSH ratios were associated with an increased number of frozen blastocysts, independent of age, AMH, BMI, E2 level, oocyte yield, and fertilization rate. Increasing LH:FSH ratios were not associated with increased number of total oocytes of mature oocytes.