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EVALUATING THE RELATIONSHIP BETWEEN BODY MASS INDEX, SERUM PROGESTERONE, AND PREGNANCY OUTCOMES IN PROGRAMMED SINGLE EUPLOID EMBRYO TRANSFER CYCLES

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OBJECTIVE:

High body mass index (BMI) has been associated with low serum progesterone (P) levels, which could potentially be negatively related to live birth following embryo transfer (1,2). This study evaluates the association between BMI, serum P, and pregnancy outcomes in programmed single euploid embryo transfer (SEET) cycles.

MATERIALS AND METHODS:

This study included patients who underwent programmed frozen-thawed SEET between January 2016-March2024. Patients were grouped by BMI class: normal (18.5-24.9), overweight (25-29.9), class I obesity (30-34.9), and class II obesity (35-39.9). Baseline characteristics were compared using Kruskal-Wallis. The primary outcome was odds of live birth. Secondary outcomes included odds of biochemical pregnancy, clinical pregnancy, ongoing pregnancy, biochemical loss, and clinical loss. Multiple logistic regression fitted with generalized estimating equations for repeated subjects was used to assess the association between BMI class, serum P, and pregnancy outcomes controlling for confounders.

RESULTS:

A total of 6,880 programmed SEET cycles were evaluated. Cohorts included normal BMI (n=4,522 (65.7%)), overweight BMI (n=1,611 (23.4%)), class I obesity (n=565 (8.2%)) and class II obesity (n=181 (2.6%)) patients. Patient age, oocyte age, serum P before transfer, serum P after transfer, and serum P at normalized surge (NsrgP) were significantly different across groups ($p < 0.001$). Otherwise, baseline cycle characteristics were similar. Adjusted analysis for patient age, oocyte age, BMI, anti-mullerian hormone (AMH) level, estradiol at normalized surge, NsrgP, endometrial thickness at transfer, and year of treatment showed a significantly higher odds of having low serum P (<18 ng/dL) in overweight, class I and class II obesity groups compared to the normal BMI group (aOR 2.69, 5.25, 22.45, respectively (all $p < 0.001$)). Adjusted

analysis including above variables demonstrated a significantly lower odds of chemical pregnancy (aOR 0.67, p= 0.03) and ongoing pregnancy (aOR 0.63. p =0.01) in the class 1 obesity group compared to the normal BMI group. The class II obesity group had significantly lower odds of ongoing pregnancy (aOR 0.42, p = 0.02) and live birth (aoR 0.33, p = 0.01) compared to the normal BMI group.

CONCLUSIONS:

High BMI patients undergoing programmed SEET exhibit significantly higher odds of low serum P and may have diminished odds of live birth compared to normal BMI counterparts. Patients with high BMI may have altered P metabolism and endometrial receptivity and should be counseled about their implantation potential and possible proactive strategies prior to undergoing SEET.

IMPACT STATEMENT:

Patients undergoing programmed SEET with high BMI, especially class I and II obesity, have significantly lower odds of ongoing pregnancy and live birth compared to patients with normal BMI.

REFERENCES:

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