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American Society for Reproductive Medicine 2018 Scientific Congress & Expo
October 6 to 10, 2018 • Denver, Colorado, USA

Title:

ELEVATED BODY MASS INDEX ON REPRODUCTIVE OUTCOME IN DONOR EGG RECIPIENTS UNDERGOING SINGLE EUPLOID EMBRYO TRANSFERS

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Objective:

Obesity is a worldwide epidemic that has been shown to negatively impact reproductive health, though studies demonstrate conflicting results regarding the effect of obesity on pregnancy outcomes in patients undergoing in vitro fertilization (IVF). Potential deleterious effects of obesity on oocyte quality and endometrial receptivity have been suggested, but quantitative and precise evidence of such effects remains limited. Oocyte donation (OD) cycles provide an opportunity to minimize the confounding effect of oocyte quality, and isolate the potential effect of increased body mass index (BMI) on the endometrium. The aim of this study was to determine if overweight and obese patients had similar pregnancy outcomes compared to normal weight controls following the transfer of a frozen-thawed single blastocyst (FET) in recipients of donated oocytes.

Design:

Retrospective cohort study at a single center

Materials and Methods:



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Oocyte recipients who subsequently underwent single blastocyst FET between 2004 and 2018 were included. Patients were categorized by BMI (Normal Weight: 18.5-24.99 kg/m²; Overweight: 25-29.99 kg/m²; Obese: ≥ 30.0 kg/m²). Underweight patients (BMI ≤ 18.49 kg/m²) and patients with an endometrial thickness <7 mm at the time of transfer were excluded from analysis. Clinical pregnancy (CP) was defined as the sonographic presence of a gestational sac. Ongoing pregnancy (≥9 weeks)/live birth(≥24 weeks) (OP/LB) rate, early pregnancy loss (EPL) rate, and clinical pregnancy loss (CPL) rate were determined. Data were analyzed using ANOVA, Chi Squared/Fisher's Exact Tests and multivariate logistic regression.

Results:

A total of 564 patients were included in the analysis. Obese patients were significantly older than those who were Normal Weight or Overweight (45.4 ± 3.9 , $p=0.0003$). Patients in all BMI groups had similar gravidity, parity, and cycle characteristics, including endometrial thickness, percent of patients with embryos biopsied for pre-implantation genetic testing for aneuploidy (PGT-A), day of embryo biopsy for PGT-A, and blastocyst morphology (Table 1). Clinical pregnancy rate was 52.6% overall and did not significantly differ among BMI groups (Table 2). There were also no significant differences in OP/LB rate ($p=0.78$), EPL rate ($p=0.37$), CPL rate ($p=0.88$) among BMI groups, before and after adjusting for confounders.

Conclusion:

While the maternal metabolic environment has been shown to adversely affect IVF outcomes in obese women, the underlying mechanism of action is not fully understood. Following transfer of a single, frozen blastocyst in OD cycles, overweight and obese patients had similar CP, OP/LB, EPL, and CPL rates compared to normal weight controls,. The current study is the first to evaluate the impact of obesity on implantation, independent of oocyte quality, and confirms that maternal obesity exhibits minimal effect on the endometrium. Future studies of the endometrial transcriptome and metabolome may ultimately improve our understanding of the precise impact of nutritional status and obesity on functional endometrial receptivity.

Support:

None



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Table 1:

Patient Demographics and Cycle Characteristics by BMI Category

	Normal Weight (n=368)	Overweight (n=101)	Obese (n=95)	P Value
Age	43.4 ± 4.6	44.0 ± 3.8	45.4 ± 3.9	0.0003
Nulligravid	38 (10.3%)	8 (7.9%)	13 (13.7%)	0.26
Nulliparous	112 (30.4%)	32 (31.7%)	34 (35.8%)	0.84
Endometrial Thickness at time of Transfer	9.4 ± 1.8	9.4 ± 1.8	9.5 ± 1.8	0.83
Endometrial Type 2 at time of transfer	36 (9.8%)	15 (14.9%)	13 (13.7%)	0.24
% PGT	112 (30.4%)	28 (27.7%)	19 (20.0%)	0.13
Embryo biopsy on Day 5	182 (49.9%)	53 (52.5%)	43 (45.3%)	0.56
Embryo Expansion Grade 4	222 (60.3%)	65 (64.4%)	69 (72.6%)	0.33
Embryo Inner Cell Mass Grade A	256 (72.7%)	68 (69.4%)	63 (67.7%)	0.54
Embryo Trophectoderm Grade A	154 (43.9%)	43 (43.9%)	38 (41.3%)	0.51



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Table 2:

Pregnancy outcomes based on BMI Category

	All (n=564)	Normal Weight (n=368)	Overweight (n=101)	Obese (n=95)	P Value
Clinical Pregnancy Rate	297 (52.6%)	195 (53.0%)	50 (49.5%)	52 (54.7%)	0.75
Ongoing Pregnancy/Live Birth Rate	235 (41.7%)	155 (42.1%)	39 (38.6%)	41 (43.2%)	0.78
Early Pregnancy Loss Rate	69 (12.2%)	51 (13.9%)	10 (9.9%)	8 (8.4%)	0.37
Clinical Pregnancy Loss Rate	62 (20.8%)	40 (20.5%)	11 (22.0%)	11 (21.2%)	0.88