Endometrial growth ratio predicts perinatal outcomes in singleton births following single thawed blastocyst transfers

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Background

Endometrial thickness has been reported to have moderate effects on birth weight and other perinatal outcomes. This total thickness includes the original baseline thickness plus any growth that occurred during the proliferative phase. The current study investigates whether the endometrial growth ratio (EGR, defined below) is associated with birth weight, gestational age at birth, low birthweight (LBW), and small for gestational age (SGA).

Methods

Single thawed blastocysts were transferred in artificially prepared cycles after endometrial preparation with exogenous estradiol. Endometrial thickness was measured by transvaginal ultrasound at baseline before estradiol start and again at progesterone start. The ratio of the thickness at progesterone start to the baseline thickness defined EGR. Endometrial thickness at least 7mm (≥8mm preferred) was considered adequate before initiating intramuscular progesterone. To avoid any potential effect of vanished twins, only single-embryo transfers, singleton pregnancies, and singleton live births were included in this analysis. Linear regression was used to assess correlations of EGR with birthweight and gestational age. Logistic regression was used to assess correlations between EGR and the rates of SGA and LBW (<2500g). P-value <0.05 was considered significant.

Results

Growth Ratio	N	Mean gestational age (d)	Mean Birth weight (g)	LBW (<2500g) cases (%)	SGA cases (%)
<2.00	77	271.5±9.4	3268±491	9 (11.7)	11 (14.3)
2.00 to 2.99	294	271.4±9.4	3323±495	20 (6.8)	35 (11.9)
3.00 to 3.99	127	270.8±10.2	3376±529	4 (3.1)	12 (9.5)
4.00 to 4.99	52	272.1±10.4	3359±453	2 (3.8)	2 (3.9)
≥5.00	20	276.1±9.8	3530±398	0 (0.0)	0 (0.0)

Table 1: Outcomes of 570 singleton births after single thawed blastocyst transfer.

Figure 1: Rates of Low birth weight (LBW) and Small for gestational age versus the endometrial growth ratio (EGR).

570 singleton live births were included in the study period. Baseline endometrial thickness measured 3.9¬±1.1 mm (mean±SD), total thickness measured 10.2±2.0 mm, endometrial growth measured 6.2±2.1 mm, gestational age at birth measured 271.5±9.7 days, birth weights measured 3338±497 g, and 60 cases of SGA (10.5% of births) and 35 cases of low birthweight (6.1% of births) were observed. EGR averaged 2.79±1.04 and ranged from 1.13 to 11.1, and was significantly correlated with birth weight (P=0.0136), LBW (P=0.0006), and SGA (P=0.0010), but was not significantly correlated with gestational age (P=0.1584). See Table 1 and Figure 1.
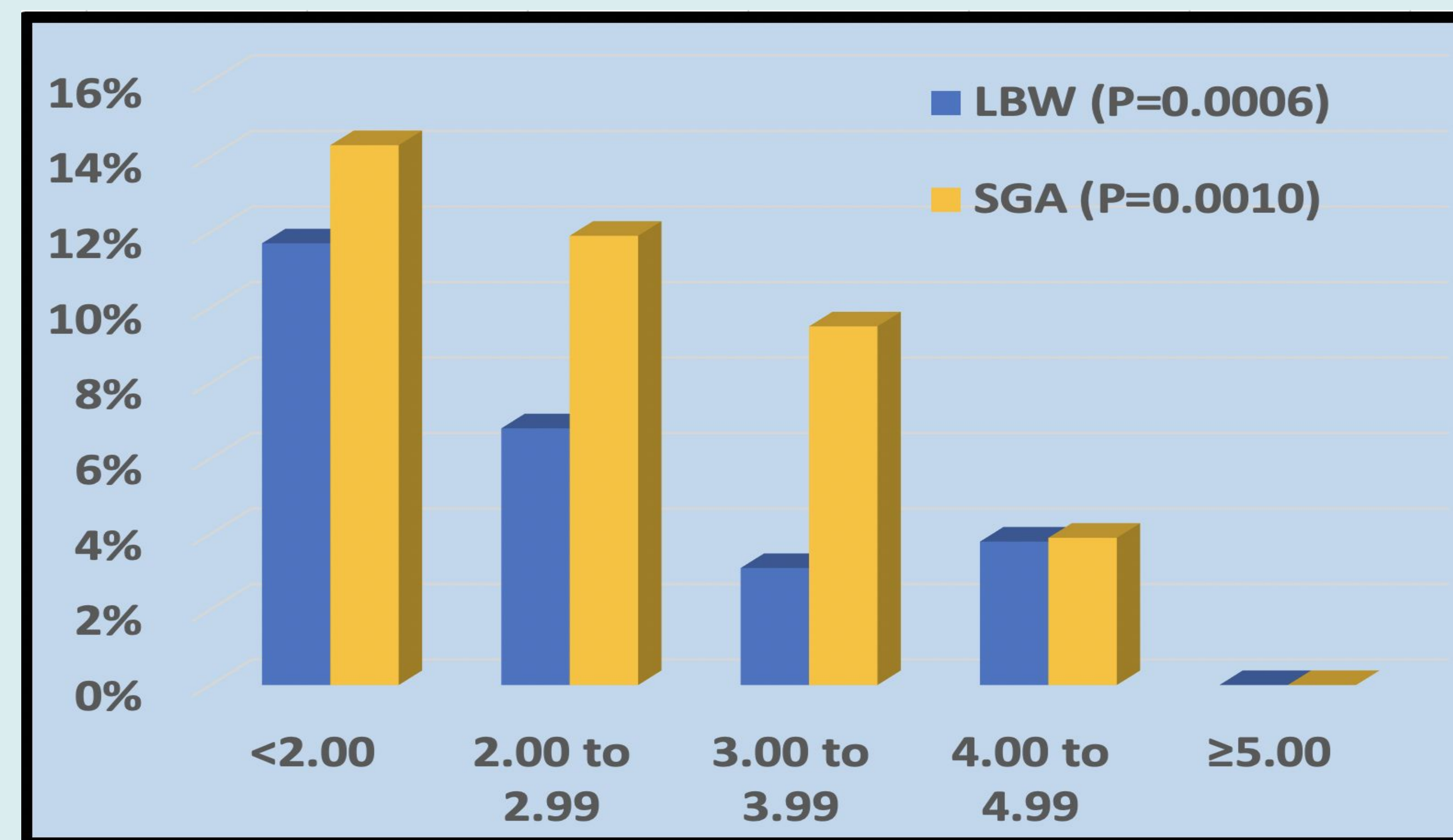
Conclusions

The risks of LBW and SGA have strong negative correlations with EGR, the ratio of endometrial thickness at progesterone start to thickness at baseline.

Impact

If these are causal relationships, then endometrial thickness at progesterone start exceeding baseline thickness by a factor of at least 4.0 would minimize the risk of LBW and SGA. Further investigation is warranted.