

## THE EFFECTIVENESS OF PARAFFIN OIL AND MINERAL OIL FOR DAY-5 EMBRYO CULTURE IN COUPLES UNDERGOING IN VITRO FERTILIZATION

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### BACKGROUND AND AIM

Oil overlay microdrop is commonly used in in vitro fertilization (IVF) procedure to prevent evaporation and to reduce temperature, pH fluctuation in the medium. It is also used as a barrier against microbial contamination. It has been shown that the quality of oil can affect the ability of embryos to reach the blastocyst stage. In daily practice, mineral oil and paraffin oil are commonly used. The aim of this study is to compare the effectiveness of paraffin oil and mineral oil for day-5 embryo culture.

### METHODS

This was a multi-center, retrospective cohort study, performed at IVFMD, My Duc Hospital and IVFMD Phu Nhuan, My Duc Phu Nhuan Hospital from January 2019 to September 2019. All patients treated by intracytoplasmic sperm injection (ICSI) and undergoing day-5 transfer were involved. From January 2019 to May 2019, we used Mineral oil (LiteOil, LifeGlobal) while Paraffin oil (Liquid Paraffin, Origio) was used from June 2019 to September 2019. In both centers, group culture system was used. Embryo transfer was performed on day 5, either fresh transfer or after a freeze-only strategy. Primary outcome was ongoing pregnancy rate after the first transfer. The number of day-5 good quality embryo, number of day-5 embryo frozen, clinical pregnancy rate, multiple pregnancy rate, implantation rate and miscarriage rate after the first transfer were used as secondary outcomes.

### RESULTS

Between 1<sup>st</sup> January 2019 and 30<sup>th</sup> September 2019, there were 4,023 couples undergoing ART treatment at both centers. 785 (389 in the Paraffin group and 396 in the Mineral group) eligible couples were included in the study. There were 12 (3.1%) couples in the Paraffin group and 11 (2.8%) couples in the Mineral group having no blastocyst for transfer. Mean age of women was 31.6 ± 4.4 in the Paraffin group versus 31.9 ± 4.8 in the Mineral group. Other patients' characteristics were also comparable between the two groups (Table 1). Treatment cycle's characteristics were presented in Table 2. The majority of couples were transferred after a freeze-only strategy.

Of those who undergoing embryo transfer, ongoing pregnancy after the first transfer occurred in 174 (46.2%) couples in the Paraffin group, compared to 175 (45.5%) couples in Mineral group (risk ratio 1.02, 95% confidence interval 0.87 – 1.12). Other secondary outcomes were comparable between the two groups.

### CONCLUSIONS

Paraffin oil resulted in a comparable ongoing pregnancy rate with Mineral oil in day-5 embryo culture. Therefore, the choice of which one to use might be based on the availability and the cost-effective analysis results.

Table 2. Treatment cycle's characteristics.

Characteristics	Paraffin oil (n = 389)	Mineral oil (n = 396)	p-value
Duration of stimulation (Day)	8.8 ± 1.6	9.2 ± 15.1	0.63
Total FSH dosage (IU)	2110.5 ± 632.8	2161.5 ± 735.3	0.31
Estradiol level on triggering day (pg/ml)	7507.8 ± 7258.1	7649.1 ± 7073.5	0.81
Progesterone level on triggering day (ng/ml)	1.0 ± 0.7	1.1 ± 0.6	0.36
No. of oocytes retrieved	17.7 ± 8.3	17.3 ± 8.0	0.52
No. of metaphase II oocytes	14.1 ± 7.4	14.2 ± 6.9	0.84
No. of two-pronuclear fertilized oocytes	10.4 ± 6.3	10.4 ± 5.9	0.95
No. of blastocysts	6.0 ± 3.8	5.9 ± 3.4	0.61
No. of good quality blastocysts	2.7 ± 2.2	2.6 ± 2.3	0.39
No. of frozen blastocysts	4.9 ± 2.9	4.6 ± 2.6	0.12
No. of couples without blastocyst for transfer - no. (%)	12 (3.1)	11 (2.8)	0.97
Types of transfer <sup>φ</sup> - no. (%)			0.18
- Fresh embryo transfer	21 (5.6)	32 (8.3)	
- Frozen embryo transfer	356 (94.4)	353 (91.7)	
No. of blastocyst transferred	1.2 ± 0.4	1.2 ± 0.4	0.23
No. of good quality blastocyst transferred	0.9 ± 0.4	0.9 ± 0.5	0.13

Plus-minus values are means ± standard deviation. <sup>φ</sup>Couples without blastocyst for transfer were excluded.

Table 3. Clinical outcomes.<sup>φ</sup>

	Paraffin oil (N = 377)	Mineral oil (N = 385)	Between-group Difference (95% CI)	Risk ratio (95% CI)	p-value
Ongoing pregnancy - no. (%)	174 (46.2)	175 (45.5)	0.7 (-6.64, 8.04)	1.02 (0.87, 1.12)	0.90
Clinical pregnancy - no. (%)	208 (55.2)	207 (53.8)	1.4 (-5.93, 8.74)	1.03 (0.83, 1.13)	0.75
Multiple pregnancy - no. (%)	19 (5.0)	29 (7.5)	-2.5 (-1.21, 6.19)	0.67 (0.38, 1.17)	0.21
Implantation rate (%)	51.7 (49.1)	48.1 (48.4)	3.6 (-10.61, 3.27)	-	0.30
Miscarriage - no. (%)	34 (9.0)	30 (7.8)	1.2 (-5.43, 2.98)	1.15 (0.72, 1.85)	0.63
Ectopic pregnancy - no. (%)	0	2 (0.5)	-	-	-

<sup>φ</sup>Those without blastocyst for transfer were excluded.

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Table 1. Patient's characteristics.

Characteristics	Paraffin oil (n = 389)	Mineral oil (n = 396)	p-value
Age (year)	31.6 ± 4.4	31.9 ± 4.8	0.26
Body mass index (kg/m <sup>2</sup> )	21.7 ± 2.6	21.5 ± 2.4	0.13
Anti Mullerian Hormone (ng/mL)	4.9 ± 3.4	4.5 ± 3.0	0.12
Antral Follicle Count	20.0 ± 10.4	19.0 ± 10.3	0.24
Type of infertility causes - no. (%)			0.25
- Primary	209 (53.7)	230 (58.1)	
- Secondary	180 (46.3)	166 (41.9)	
IVF indication - no. (%)			0.20
- Diminished ovarian reserve	13 (3.3)	11 (2.8)	
- Tubal factor	58 (14.9)	40 (10.1)	
- Male factor	151 (38.8)	180 (45.5)	
- Ovulation Disorder	48 (12.3)	45 (11.4)	
- Unexplained	55 (14.1)	47 (11.9)	
- Others	64 (16.5)	73 (18.4)	

Plus-minus values are means ± standard deviation.