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Original Research Article

Blastulation rate using fresh versus devitrified oocytes using homologous and heterologous sperm in an assisted reproduction clinic in a middle-income country

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ABSTRACT

Background: Assisted reproduction has revolutionized the field of reproductive medicine, giving hope to many couples who face difficulties conceiving naturally. In this case, fresh oocytes and devitrified oocytes play a fundamental role in fertility treatments.
Methods: Descriptive, retrospective and observational study in which the records of the HISPAREP reproduction clinic of the Spanish hospital were analyzed in the period from 2020 to 2022.
Results: A total of 136 blastocysts that reached day 5 were studied compared to 8 embryos that were blocked before reaching blastulation. Of this, 76 oocytes were fresh, of which 97.4% reached day 5 (74) and the remaining two were blocked. Of the vitrified ones, a total of 68 were devitrified and of these 91.2% reached D5. Of the correctly fertilized oocytes, 96.5% (136) reached blastocysts compared to 5 that were blocked and 3 that were blocked from those that were not fertilized. Regarding the fertilization rate of fresh oocytes, a total of 76 was obtained, which is equivalent to 100%, and of the devitrified oocytes, 65 were fertilized (95.6%) and 3 were not fertilized (4.4%). With a variation of 6.2% in the blastocyst rate, between fresh and devitrified oocytes.
Conclusions: There is no significant difference in the reproductive results of fresh and vitrified oocytes. It is necessary to try to carry out more studies with a larger sample size to obtain more conclusive results. The reproductive outcomes of fresh oocytes and oocytes devitrified using fresh sperm and frozen sperm are similar. With this, fresh oocytes have a slightly higher probability of implantation.

Keywords: ICSI, Fresh oocytes, Vitrified oocytes, Blastocyst, Homologous semen, Heterologous semen

INTRODUCTION

Assisted reproduction has revolutionized the field of reproductive medicine, offering hope to many couples facing difficulties conceiving naturally. In this case, both fresh and vitrified oocytes play a fundamental role in fertility treatments.[1]

Fresh oocytes refer to eggs obtained directly from a woman's ovaries in a specific menstrual cycle. These oocytes are collected and immediately used for IVF/ICSI cycles or for oocyte cryopreservation. The advantage of fresh oocytes lies in their immediate availability for fertilization.[2]

On the other hand, vitrified oocytes are eggs that have undergone a cryopreservation process. This method allows preserving the oocytes while maintaining their viability and fertilization capacity for later use in subsequent cycles. Vitrified oocytes offer the advantage of being stored and

used at more convenient times, providing flexibility in assisted reproduction treatments.[3]

Both fresh and vitrified oocytes have their own advantages and factors to consider. Fresh oocytes are usually preferred in treatments where fertilization must occur immediately, such as in conventional IVF/ICSI. On the other hand, vitrified oocytes are an attractive option for those who wish to preserve their fertility due to medical conditions, especially those affecting ovarian function.[4]

There are several studies that have compared reproductive outcomes of fresh and frozen oocytes. In one study, the success rate of IVF with fresh oocytes was 38%, while the success rate of IVF with frozen oocytes was 34%.[5] In another study, the success rate of intracytoplasmic sperm injection (ICSI) with fresh oocytes was 42%, while success rate of ICSI with vitrified oocytes was 38%.[6]

METHODS

A descriptive, retrospective, and observational study was conducted in which records of HISPAREP reproduction clinic at the Spanish hospital were analyzed for the period from 2020 to 2022. Cases included all embryos that underwent intracytoplasmic injection during these periods and subsequently reached blastocyst stage. Likewise, it was recorded whether origin of egg was homologous/ through egg donation, and sperm sample with which it was inseminated, either homologous or heterologous.

Statistical analysis

An analysis was carried out with descriptive and inferential statistics. For the descriptive analysis frequencies and proportions were used for categoric variables, as well as measures of central tendency and dispersion for numeric variables. Depending on normality and homoscedasticity, parametric or non-parametric tests were used to compare before and after.

Categorical variables are described as absolute frequencies and percentages. Association between categorical variables was tested using the chi-square test. A p value less than or equal to 0.05 was considered significant. Ddata were analyzed using the statistical package SPSS version 25.

RESULTS

The comparison of the blastocyst rate along with the characteristics of the patient, oocytes, and sperm sample are detailed in Table 1, a total of 136 blastocysts that reached day 5 were studied compared to 8 embryos that arrested before reaching blastulation. Of these, 76 oocytes were fresh, of which 97.4% reached day 5 (74), and the remaining two arrested. From the vitrified ones, a total of 68 were thawed, and of these, 91.2% reached D5. Of the properly fertilized oocytes, 96.5% (136) reached blastocyst compared to 5 that arrested, and 3 were arrested from the non-fertilized ones.

Table 1: Demographic characteristics of patient, oocytes and sperm sample.

Variables	Day 5 blastocyst, (n=136) N (%)	Blocked embryos, (n=8) N (%)	P value*
Age (in years)			
24-34	25 (100)	0 (0)	0.119
35-39	54 (90)	6 (10)	
≥ 40	57 (96.6)	2 (3.4)	
Oocyte type			
Fresh	74 (97.4)	2 (2.6)	0.105
Thawed	62 (91.2)	6 (8.8)	
Oocyte origin			
Self-patient	103 (92.8)	8 (7.2)	0.113
Donor	33 (100)	0 (0)	
Sperm sample type			
Fresh	109 (95.6)	5 (4.4)	0.232
Frozen	27 (90)	3 (10)	
Semen sample			
Homologous	115 (95)	6 (5)	0.473
Heterologous	21 (91.3)	2 (8.7)	
Fertilized eggs			
Correctly fertilized	136 (96.5)	5 (3.5)	0.001
Non-fertilized	0 (0)	3 (100)	

*Chi-square test.

Regarding the fertilization rate of fresh oocytes, a total of 76 were obtained, equivalent to 100 percentages, and of the thawed ones, 65 fertilized (95.6%) and three did not fertilize (4.4%). Likewise, the comparison of embryonic development among 3 groups can be observed in Table 1.

In total, 97.4% of the fresh oocytes reached day 5, compared to 91.2% of the thawed ones. In the case of donated gametes, the observed blastulation rate was 100% (Figure 1).

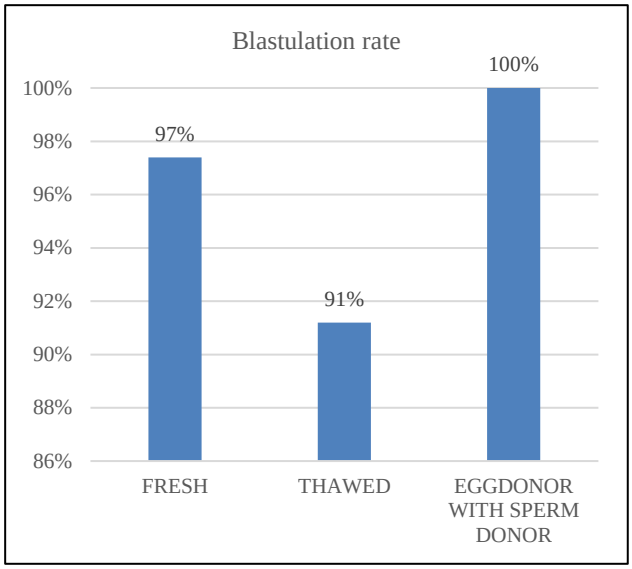

Figure 1: Blastulation rate.

DISCUSSION

The patient's age did not show statistically significant differences between oocytes that reached day 5 and those that did not. For the rest of the variables, no difference was found in the blastocyst rate between fresh and thawed oocytes, self-derived and donor-derived oocytes, and fresh vs thawed sperm samples, as well as between homologous and heterologous samples. All p values were above the cutoff of 0.05, consistent with findings reported in the literature.[7-10]

The reproductive outcomes of fresh oocytes compared to vitrified oocytes using both fresh and frozen sperm have been extensively studied. It is generally accepted that fresh oocytes yield better reproductive outcomes than vitrified ones. However, it has been reported that vitrified oocytes can still be successful, with success rates typically comparable to those of fresh oocytes. In our results, we observed a difference of 6.2%, which aligns with the literature.[11-15]

The reproductive outcomes of fresh and vitrified oocytes using both fresh and frozen sperm are similar. Fresh oocytes have slightly higher likelihood of success.[16] There is no significant difference in reproductive outcomes of fresh and vitrified oocytes, suggesting that vitrification remains a viable technique with no impact on blastulation rate.[17-19] Further studies with larger sample sizes will be necessary to obtain more conclusive results.[20-25]

CONCLUSION

There is no significant difference in the reproductive outcomes of fresh and vitrified oocytes. It is necessary to try to conduct more studies with larger sample sizes to obtain more conclusive results. The reproductive outcomes of fresh and vitrified oocytes using both fresh and frozen sperm are similar. Consequently, fresh oocytes have a slightly higher probability of implantation.

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