



Duration of cryo-storage and survival rates, implantation potential of vitrified human embryos

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INTRODUCTION

Cryopreservation has transformed assisted reproductive technology by allowing flexible embryo storage and transfer, yet the optimal timing between ovum pick-up and frozen embryo transfer for best pregnancy outcomes remains uncertain.

Aims & Objective: To evaluate the effect of long- term cryopreservation of embryos on the survival rate, implantation rate and neonatal outcomes of FET cycles.

Rationale: Does prolong cryo-storage of Embryos have any impact on the live-births & neonatal outcomes following transfer of these embryos?

METHODOLOGY

- **Study Design:** Single center retrospective cohort study conducted at tertiary care hospital.
- **Study Settings:** Tertiary care hospital
- After obtaining institutional ethics committee approval Women who underwent frozen embryo transfers between January 2014 -December 2023 were included.
- The data was extracted from hospital Medical records i.e., baseline characteristics, cycle details, embryological details and cycle outcomes.
- FET cycles were categorized based on duration of embryo vitrification

OUTCOMES

- **Primary Outcome:** Live Birth Rate (LBR): Defined as the proportion of FET cycles resulting in at least one live-born infant at >24 weeks of gestation.
- **Secondary Outcomes:** Clinical Pregnancy Rate (CPR) and Neonatal outcomes (e.g., birth weight, preterm delivery, type of delivery)

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS software. Analysis involved descriptive statistics, group comparisons using appropriate tests, and logistic regression to evaluate factors affecting clinical pregnancy, live birth, and miscarriage rates, with significance set at $P < 0.05$.

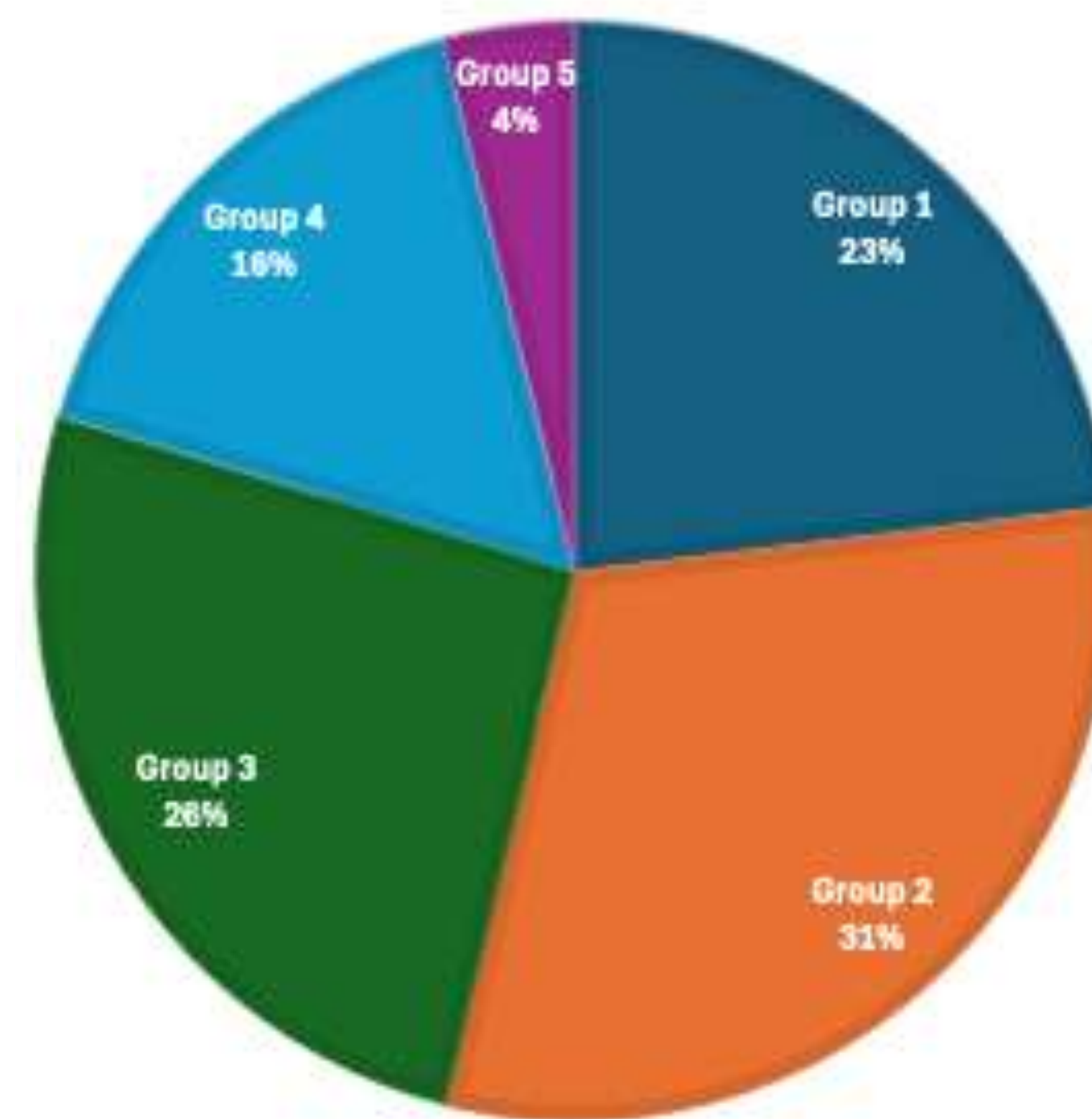


Figure: FET cycles were divided into 5 groups based on duration of vitrification.



RESULTS

A total of 1,112 frozen embryo transfer cycles were included. FET cycles were divided into 5 groups based on duration of vitrification.

- The survival rate of vitrified embryos did not vary significantly with duration of vitrification.
- Clinical pregnancy rate and live birth rate (36.25% in group 2 to 9.09% in group 5, $p < 0.001$) decreased significantly.
- The neonatal outcomes were comparable in terms of type of delivery, birth weight, gender and preterm delivery among the 5 groups.

Group	Duration of Vitrification	Number of FET Cycles (n)
Group 1	< 3 months (1–90 days)	257
Group 2	3 to 6 months (91–180 days)	342
Group 3	6 months to 1 year (181–365 days)	286
Group 4	1 to 3 years (366–1095 days)	183
Group 5	> 3 years (> 1095 days)	44

CONCLUSION

Our study suggests that in autologous frozen thawed embryo transfer cycles, the prolonged duration of cryo-storage beyond 3 years may be associated with a decline in clinical pregnancy rate and live birth rate. However, there was no effect on the embryo survival rate and neonatal outcomes.

Therefore, we conclude that cryopreserved embryos should be recovered as soon as possible for successful implantation and to improve live birth rate.

However, under unavoidable circumstances, prolonged cryo-storage could be considered as it does not affect the neonatal outcomes.

REFERENCES

1. Trounson A, Mohr L. Human pregnancy following cryopreservation, thawing and transfer of an eight-cell embryo. *Nature* 1983;305:707-9.
2. Bergenheim SJ, Saupstad M, Pistoljevic N, Andersen AN, Forman JL, Løssl K, et al. Immediate versus postponed frozen embryo transfer after IVF/ICSI: a systematic review and meta-analysis. *Hum Reprod Update* 2021;27:623–42.
3. Wirleitner B, Vanderzwalmen P, Bach M, Baramsai B, Neyer A, Schwerda D, et al. The time aspect in storing vitrified blastocysts: its impact on survival rate, implantation potential and babies born. *Hum Reprod* 2013;28:2950–7.
4. Lee HN, Park JK, Paek SK, Byun JH, Song H, Lee HJ, et al. Does duration of cryostorage affect survival rate, pregnancy, and neonatal outcomes? Large-scale single-center study of slush nitrogen (SN2) vitrified-warmed blastocysts. *Int J Gynaecol Obstet* 2021;152:351–7.
5. Sekhon L, Lee JA, Flisser E, Copperman AB, Stein D. Blastocyst vitrification, cryostorage and warming does not affect live birth rate, infant birth weight or timing of delivery. *Reprod Biomed Online* 2018;37:33–42.

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