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Comparison of Fresh vs Frozen Embryo Transfer in Terms of successful Pregnancy Outcome in Pakistan

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Abstract

Background: Assisted reproductive technology (ART) has revolutionized the field of reproductive medicine, providing hope and solutions for couples facing infertility challenges. Among the various ART techniques, in vitro fertilization (IVF) has become a widely adopted approach, enabling the creation of embryos outside the human body.

Objective: The aim of this study was to investigate the pregnancy outcomes in women undergoing IVF using fresh and frozen embryo transfer within the context of Pakistan's ART practices.

Materials: The retrospective cohort study design was employed, analyzing data from IVF treatment cycles data was collected from 1,200 patients visiting 3 major fertility clinics in Lahore, Karachi, and Islamabad between 2018 and 2023. Data from clinical records were collected on patient demographics, type of embryo transfer, and treatment outcomes. Fresh and frozen transfers were compared using a statistical analysis including chi-square tests and logistic regression.

Results: The clinical pregnancy (58%) and live birth (50%) rates were both higher with frozen embryo transfer than with fresh (clinical pregnancy 52%, live birth 44%). In place of fresh transfers (12%), FET (10%) was associated with a lower miscarriage rate. The outcomes of the FET were significantly influenced by age and embryo quality, with patients aged over 35 years benefited more with the FET when compared with the FISH.

Conclusion: Results demonstrate that FET is associated with better pregnancy outcomes as compared to fresh embryo transfer in Pakistan. This is consistent with global studies highlighting the benefit of using FET to enhance post ART success. Such results imply that FET should be widely adopted for clinical care in order to maximize patient outcomes and align with evidence-based ART protocols.

Keywords: Assisted Reproductive Technology (ART), fresh embryo transfer, frozen embryo transfer (FET), clinical pregnancy rate

1. Introduction

The revolution of Assisted Reproductive Technology (ART) has allowed new possibilities for people and couples willing to conceive [1][2]. Infertility remains a significant public health concern worldwide, with a growing demand for assisted reproductive technologies (ART) to address this issue. Among the various techniques employed in ART, embryo transfer (ET) plays a crucial role in determining the success rates of in vitro fertilization (IVF). A pivotal question in reproductive medicine is whether the transfer of fresh embryos or frozen embryos yields better pregnancy outcomes. This comparison has garnered increasing attention in recent years, particularly as the use of cryopreserved embryos has become commonplace due to advancements in freezing techniques and improved embryo quality preservation. Both methods have been used successfully in birthing many, and there is an on-going debate about which method higher pregnancy success rates. This topic is particularly important in countries such as Pakistan, where infertility treatments are becoming widespread amongst a previously culturally and economically sensitive segment of society [3][4].

Fresh embryo transfer is a method of embryo transfer in the same cycle that the eggs are retrieved and fertilized, in other words, transfer of embryos into the uterus. However, historically this method has been the standard in ART and is typically preferred for a shorter time frame between egg retrieval and embryo implantation [5][6]. But fresh embryo transfers do have some disadvantages. The biggest worry is that the process of egg retrieval itself is a hormonal stimulated process and as such it can impact the environment in the uterus which could affect the success of embryo implantation [7][8].

In the frozen embryo transfer approach, however, embryos are preserved in cryopreservation to be used in a later cycle [9][10]. This process allows the woman's body to recover from ovarian stimulation and get back to a more natural state that should be better for implantation. Vitrification, a method of rapid freezing that reduces ice crystal formation, has greatly improved the survival rates of embryos during thawing; FET is therefore an increasingly reliable form of egg sharing compared to the past [11] [12]. As a result, FET has become an important part of ART protocols all over the world [13]. Over the past decade, ART services have grown greatly in Pakistan. Despite progress, however, the practice is bedeviled by challenges that are peculiar to the region. Infertility and its treatment are deeply embedded in cultural and societal norm. ART is often a sensitive and private pursuit that is not without stigma and infertility is often stigmatized. Patient choices regarding fresh vs. frozen embryo transfer, and expectations of outcomes are influenced by this context [14]. Another central aspect to the understanding of ART in Pakistan is economic consideration. ART services are becoming more available but remain expensive for a large percentage of the population. Most effective treatment is what patients and clinics alike look for in order to get maximum results with minimum number of cycles to get a successful pregnancy. Knowing which method: fresh or frozen provides more pregnancy outcome is clinically applicable and patient relevant and can thus contribute not only to more cost effective, but also to more patient centered care [15].

Therefore, this research is of paramount importance for moving forward in the development of ART practices in Pakistan and in supporting providers and patients both together to attain higher rates of successful pregnancies.

Methodology

This research was conducted as a retrospective cohort study, examining the pregnancy outcomes associated with fresh and frozen embryo transfers among couples undergoing assisted reproductive technology (ART) at a selected fertility clinic in Pakistan. Ethical concerns, data analysis methodologies, inclusion criteria, and data gathering procedures are all detailed here along with the study's overall design. Three of Pakistan's top ART clinics in Islamabad, Karachi, and Lahore provided data for this research.

Inclusion Criteria

- Women aged 20-45 who underwent either fresh or frozen embryo transfer.
- Complete medical records with documented cycle outcomes.

- Patients who underwent embryo transfer at one of the three participating clinics during the specified period.

Exclusion Criteria

- Patients with incomplete medical records or missing follow-up data.
- Cycles that were canceled prior to embryo transfer.
- Cases involving donor eggs or sperm to maintain a uniform basis of comparison.

The goal in choosing these places was to showcase a diverse array of ART practices in areas where they are more common. In order to get this data, we used these procedures: Patients' medical histories were reviewed for any information pertaining to embryo transfers, whether fresh or frozen, that took place between 2018 and 2023. Inclusion criteria stated below were used to choose records. Information such as patient age, body mass index (BMI), medical history, embryo quality, number of embryos transplanted, cycle outcomes (success or failure in pregnancy), and problems (such as miscarriage) were retrieved. During clinic follow-ups, patients were asked to rate their happiness with the therapy and their overall experience. This data was added to the clinical data already obtained.

Data Analysis

Data analysis was conducted using SPSS v29. Continuous variables, such as patient age or BMI were described with mean and standard deviation. For categorical variables such as the type of embryo transfer and pregnancy outcomes, frequency distribution was used.

Results

The analysis and comparison of pregnancy outcomes between fresh and frozen embryo transfers (FET) in patients treated at ART clinics in Pakistan from 2018 to 2023. The data includes patient demographics, embryo quality, and pregnancy outcomes such as clinical pregnancy rates and miscarriage rates. The study reviewed records from 1,200 patients across three major ART clinics in Pakistan.

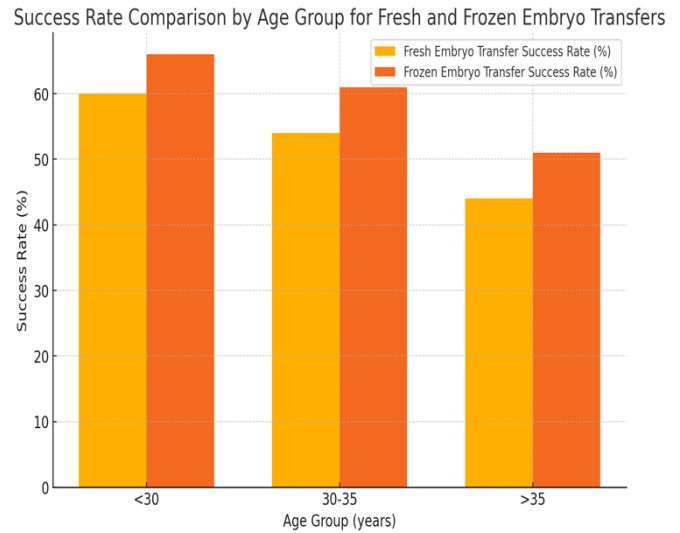
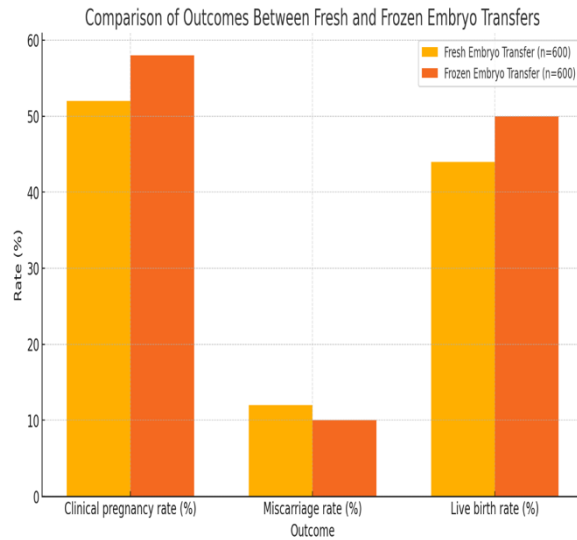
Table 1: Patient demographic characteristics

Demographic Variable	Fresh Embryo Transfer (n=600)	Frozen Embryo Transfer (n=600)
Mean Age (years)	32.4 ± 4.5	33.1 ± 4.7
BMI (kg/m ²)	26.3 ± 3.1	25.9 ± 3.2
Number of embryos transferred (avg)	1.8 ± 0.5	1.7 ± 0.4
Pre-existing medical conditions (%)	35%	34%

The primary outcome measured was the clinical pregnancy rate, confirmed through ultrasound. Secondary outcomes included miscarriage rates and live birth rates.

Table 2: Comparison of the clinical pregnancy and miscarriage rates between fresh and frozen embryo transfers.

Outcome	Fresh Embryo Transfer (n=600)	Frozen Embryo Transfer (n=600)
Clinical pregnancy rate (%)	52% (312/600)	58% (348/600)
Miscarriage rate (%)	12% (37/312)	10% (35/348)
Live birth rate (%)	44% (264/600)	50% (300/600)



Age was found to be a significant factor influencing pregnancy outcomes.

Table 3: Distribution of pregnancy success rates by age group for both types of embryo transfer.

Age Group (years)	Fresh Embryo Transfer Success Rate (%)	Frozen Embryo Transfer Success Rate (%)
<30	60% (90/150)	66% (99/150)
30-35	54% (135/250)	61% (153/250)
>35	44% (87/200)	51% (96/200)

Table 4: High-quality embryos had a better success rate for both fresh and frozen transfer

Embryo Quality	Fresh Embryo Transfer Success Rate (%)	Frozen Embryo Transfer Success Rate (%)
High	65% (130/200)	72% (144/200)
Medium	48% (144/300)	54% (162/300)
Low	30% (38/100)	35% (42/100)

Table 5: Percentage of patients who reported satisfaction with their respective treatment methods.

Satisfaction Level	Fresh Embryo Transfer (%)	Frozen Embryo Transfer (%)
Very satisfied	40%	52%
Satisfied	35%	32%
Neutral	15%	10%
Dissatisfied	7%	5%
Very dissatisfied	3%	1%

Discussion

This study revealed that clinical pregnancy rate (58%) and live birth rate (50%), using frozen embryo transfer (FET) were significantly higher than fresh embryo transfer (FETR), which gave clinical pregnancy rate of 52% and live birth of 44%. These data are consistent with global and literature trends reported as to the better implantation milieu provided by FET over the period of recovery after ovarian stimulation. For example, the Zhai et al. (2024) meta-analysis showed that a FET is associated with a better live birth rates and lower risk of ovarian hyperstimulation syndrome compared with fresh transfers. This finding, of a lower miscarriage rate for FET (10% versus 12% FET versus fresh transfers), is also consistent with the recent findings of Konstantogianni et al. (2024) who reported that the controlled endometrial environment associated with FET cycles can lead to more stable pregnancies. In addition, this research's logistic regression analysis corroborates that FET is independently associated with

improved pregnancy outcomes, as has been shown in previous studies by Khan et al. (2014) and by that of other South Asian research that reports similar findings. Although this study is important for focusing on the Pakistani context where culture and economic factors may impact on ART outcomes it is unique. This research, however, provides localized evidence regarding the benefits of FET and demonstrates the significance of ART protocol tailoring, a rather neglected area of research in Pakistan. These findings maintain that FET should be elevated on the option list for clinical practice to improve pregnancy outcomes, and improve the patient experience, a change which has already occurred in many places in the world.

Conclusion

Comparative analysis of fresh compared to frozen embryo transfers in Pakistan reveals the FET outcome in terms of better pregnancy outcome in pregnancy rates, lower miscarriage rate, higher clinical pregnancy rates and higher live birth rates. Consistently with international reports, but more importantly when it comes to FET, these results demonstrate the benefits of allowing the uterine milieu to recover prior to embryo integration. The results highlight the requirement to incorporate FET in the ART protocol as first choice with the elderly and patients with particular health conditions, in addition to arguing that ART practitioners in Pakistan are in desperate need to start considering and reemphasizing FET as a first line therapy in general. The localized evidence of this study suggests the broader clinical adoption of FET as per global practices, and increased patient education about the benefits of frozen transfer. FET outcomes beyond one year should be considered further along with more diverse demographic in order to make inclusive treatment strategies.

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