

Seasonal Variation and Its Impact on Blastocyst Development and Morphokinetics: Insights from a Time-Lapse Monitoring Study

Rivi Levy¹, Reham Eneam¹, Ido Izhaki², Firas Zbidat¹, Shira Baram¹, Ronit Beck¹

¹ Fertility Unit, Department of obstetrics and Gynecology, Emek Medical Center, Afula, Israel

² Department of Evolutionary and Enviromental Biology, University of Haifa

INTRODUCTION

Delivery rates from spontaneous conception vary seasonally, potentially influenced by cultural or environmental factors. However, the impact of seasonal variation on in vitro fertilization (IVF) outcomes remains unclear, particularly regarding blastocyst development and morphokinetics. Previous studies have shown conflicting results, and none have specifically examined this relationship using non-invasive time-lapse monitoring systems.

RESULTS

This retrospective cohort study analyzed prospectively collected data from 2022 to 2024. ART cycles where embryos were cultured to day 5 were categorized by season: spring (n=17; 133 embryos), summer (n=19; 163 embryos), autumn (n=9; 80 embryos), and winter (n=13; 113 embryos). Blastocyst morphokinetics were evaluated using Gardner criteria for morphological grading and a kinetic grading system incorporating multiple time-lapse parameters. Key parameters, including time of blastocyst formation (ctBlast) and the interval between specific developmental stages (tB-t2), were compared across seasons, standardized by pronuclear fading (tPNf). Statistical analyses accounted for the non-independent nature of embryos derived from the same patient.

Initial analyses, which ignored the dependent nature of embryos from the same patient, suggested that autumn was associated with significantly faster ctBlast formation and shorter tB-t2 intervals compared to summer and winter ($P=0.0022$, $P<0.001$). Kinetic scores were also higher in autumn compared to winter ($P=0.0413$). However, when the dependent nature of embryos from the same patient was accounted for, no significant seasonal effects were observed for blastocyst development or morphokinetics.

CONCLUSION

Our findings indicate no significant association between season and blastocyst development rates or kinetic scores when accounting for the dependency of embryos derived from the same patient. This underscores the importance of considering patient-specific factors in studies examining seasonal variation in IVF outcomes. Future larger-scale studies are needed to better control the dependent nature of embryos originating from the same mother and to provide more robust insights into the potential effects of seasonality on embryo development.

REFERENCES

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CONTACT

rivkalev1@clalit.org.il