

Data analysis to determine whether there is an association between the day of blastocyst formation and sex ratio

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Introduction:

A study by Alfarawati *et al.*, (2011) has shown that blastocyst grading can be associated with embryo gender, as male embryos develop faster than female embryos. Given that the most advanced blastocyst is selected for embryo transfer, it is possible that *in vitro fertilisation* (IVF) could alter the gender ratio towards a higher number of males (Luna *et al.*, 2007). Furthermore, IVF and intra cytoplasmic sperm injection (ICSI) can promote the selection of more male blastocysts for transfer as male embryos' have higher preimplantation developmental rates than female embryos (Dean *et al.*, 2011; Luna *et al.*, 2007).

Blastocysts can form on day 5 or day 6 of embryo development (Muthukumar *et al.*, 2013) and their quality can be categorised as follows; excellent (AA), good (AB, BA, BB), fair (BC, CB) or poor (CC) based on trophoctoderm and inner cell mass morphology (Dessolle *et al.*, 2011).

Objective:

This retrospective analysis aims to investigate whether there is an association between the day of blastocyst formation and sex ratio. The relevance of this study was to determine whether fertility treatment can cause a worldwide gender imbalance.

Methods:

This study included the analysis of all fresh and thawed embryo replacement treatment cycles at The Centre for Reproductive and Genetic Health (CRGH) from 01.01.12-31.12.13. A total of 261 live births were investigated, and the day of blastocyst formation, embryo quality and fetus gender were analysed.

The data collected was separated into four groups based on blastocyst quality: day 5 top quality embryos (AA), day 5 rest quality embryos (AB, BA, BB, BC, CB and CC), day 6 top quality embryos (AA), day 6 rest quality embryos (AB, BA, BB, BC, CB and CC).

Statistical analysis was performed using the test for equality of several population proportions.

The resulting data was also compared to the worldwide gender ratio statistics to involve a larger population. A p value of <0.05 indicated a non-significant result.

Discussion:

These results illustrate that:

- The quality and day of blastocyst formation did not have a direct impact on the gender outcome.
- Inner cell mass quality and trophoctoderm cell quality do not affect the sex ratio.
- The data collected from CRGH was also compared to the world wide gender sex ratio statistics, and it is clearly evident that there is no relationship between assisted reproductive technology (ART) blastocyst transfers and fetus gender outcome.

Conclusion:

Carrying out top quality day 5 vs. top quality day 6 blastocyst transfers does not result in a higher number of one of the two genders. However, larger studies should be conducted worldwide using additional variables such as the type of treatment (IVF/ICSI), patients age and medical history in order to truly determine whether the day of blastocyst formation or embryo quality can be used to predict the fetus gender outcome.

Results:

There was no significant relationship between the blastocyst quality and day of blastocyst formation on the fetus gender outcome.

Graph 1: Relationship between embryo quality, the day of blastocyst formation and the fetus gender



Table 1: Relationship between the day of blastocyst formation and embryo quality on fetus gender

Day of blastocyst formation and embryo quality	Male fetus	Female Fetus
Day 5 top	30	32
Day 5 rest	68	77
Day 6 top	8	3
Day 6 rest	19	23
Chi-square	2.89648583	
P-value	0.10496	

Table 2: Relationship between the day of blastocyst transfer and the fetus gender in comparison to the worldwide gender ratio statistics

	Male fetus	Female Fetus
Worldwide gender ratio	107	100
Day 5 total	98	109
Chi-square	0.78268	
P-value	0.376	
Day 6 total	27	26
Chi-square	0.00944	
P-value	0.923	

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