

Comparison between Day 3 and day 5 Embryo Transfer in Success Rate of ICSI- A Comparative Study

Mawahib M Omer¹, Abdelkarim A Abdrabo¹, Mohammed Rida^{2*}

¹Department of Clinical chemistry, Faculty of Medical Laboratory Science, Al-Neelain University, Khartoum, Sudan

²Dr. Elsir Abu-Elhassan Fertility Center, Khartoum, Sudan

*Corresponding Author: Mohammed Rida, Dr. Elsir Abu-Elhassan Fertility Center, Khartoum, Sudan.

Received: March 05, 2019; Published: March 27, 2019

Abstract

Objective: This study conducted to identify which embryo transfer day, day 3 or day 5, is with a better higher chance of successful implantation and pregnancy.

Materials and Methods: A total of 1150 women who had ICSI after retrieval of Oocytes on the day of fertilization check were randomly assigned to undergo embryo transfer either on day 3 or day 5.

Results: in comparison of day 3 to day 5 transfers, there was a statistically significant difference ($p = 0.000$), day 5 is with high success rate of pregnancy than day 3 of ET. Pregnancy rate is higher at age range of 29 - 39.

Conclusion: The success rate of pregnancy at day 5 of embryo transfer is better than day 3. The present data suggests that day 5 embryo transfers provide better results than day 3 transfers. In addition to, there was probability to get success ICSI with younger 18 - 28 woman compare with woman > 28 years old.

Keywords: ICSI; Success Rate; Day 3 to Day 5; Sudan

Background

Assisted reproductive technologies (ART) are offered to couple with fertility problems to have a chance for giving birth. The intracytoplasmic sperm injection (ICSI) technique is now widely used in assisted reproduction and has provided relevant information about the basic science of fertilization [1]. ICSI done by injection of a mature egg with sperm in the laboratory and then transferring the obtained embryos to the uterus [1,2]. Generally here in the fertility centers in Sudan, embryo transfer (ET) performed on the second or third day of fertilization. Controlled ovarian stimulation protocols used in ICSI, cause the endometrium and embryo to be exposed to supra physiological concentrations of estradiol (E2) and progesterone (Prog), some study showed that the elevated Prog level affected the clinical outcomes of day 3 embryo transfer [3].

The optimum time for ET is not well studied and the data obtained were contradictory, however, the time interval between injection of sperm and depositing it into the uterine cavity should be minimized as possible to avoid exposure of the embryo to the surrounding conditions, it has been suggested that a longer time interval is associated with lower implantation and pregnancy rates [4,5].

Study indicated that ET at day 5 minimize the risk of aneuploidy which is the second major category of chromosome mutations in which chromosome number is abnormal [6].

Other study concluded that, for day 3 versus day 5 transfer, there was no significant difference in the odds of pregnancy [7].

The present study was designed to compare the success rate of pregnancy between ET at day 3 (blastocyst-stage) and day 5 (cleavage-stage) in Sudanese women undergoing ICSI cycles at Dr. Elsir Abu-Elhassan Fertility Center.

Materials and Methods

Study design and participants selection

Retrospective cross-sectional study approved by the scientific committee of the Faculty of Medical Laboratory Science, Al-Neelain University. Data was collected from the records of the patients attended Dr.Elsir Abu-Elhassan Fertility Center in the period from January 2016 to December 2018. A total of 1150 Sudanese women aged between 18 to 48 years-old underwent ICSI cycles, all selected women were informed about the importance of the study and they agreed to use their data in the study.

Laboratory measurement

Blood samples were obtained by vein puncture. The serum was separated and used for measurement HCG hormone to detect presence of pregnancy.

Statistical analysis

Data was analyzed using spss program version 2, the results expensed as frequency and percentage. Chi-square was obtained to compare the frequency and percentage across injection days. p-value <0.05 consider as significant difference.

Results

Table 1, shows the general characteristics of the participants, in this study, 1150 women were enrolled. The mean maternal age was 34 ± 4.2 years, while the mean duration of infertility was 4 ± 2.5 years, and BMI mean was 22 ± 2.3. Of 1150 women included, 276 (24%) individuals were with primary infertility, while 874 (76%) individuals were with secondary infertility. Of the included women, in about 632 (55%) the cause of infertility was male factor due to abnormal semen analysis, while 230 (20%) the cause was female factors like tubal defects, endocrine, reduced ovarian reserve and ovulatory problems. Regarding the history of previous ICSI cycles, about 1051 (91.5%) women had no previous ICSI cycles, and 55 (4.7%) had one previous ICSI cycle, and 44 (3.8%) had at least two previous ICSI cycles.

Variable	Result
Age in years (Mean ± SD)	34 ± 4.2
BMI (Mean ± SD)	22 ± 2.3
Duration of infertility, years (Mean ± SD)	4 ± 2.5
Primary infertility No (%)	276 (24%)
Secondary infertility No (%)	874 (76%)
Male factors No (%)	632 (55%)
Female factors No (%)	230 (20%)
Unexplained factor No (%)	58 (5%)
Male and Female factors No (%)	230 (20%)
No previous ICSI cycles No (%)	1051 (91.5%)
Previous ICSI cycles No (%) (Once)	55 (4.7%)
Previous ICSI cycles No (%) (two or more)	44 (3.8%)

Table 1: General characteristic of patients enrolled in the study.

The majority of women included were in age group of 29 - 39 years (59%) followed by women with age 18 - 28 years (27%) and then women with age > 40 years (14%) (Table 2).

Variable	Frequency	Percentage (%)
18 - 28 Years	311	27.0
29 - 39 Years	679	59.0
≥ 40 Years	160	14.0
Total	1150	100.0

Table 2: Distribution of study population according to age groups.

Regarding the ET day, day 3 and day 5 transfers were statistically similar with respect to the age of the women, in comparison between day 3 and day 5 ET, there was a significant difference ($P < 0.05$) between the number of positive and negative pregnant results (Table 3).

Days	ICSI		Age (mean ±SD)	Total
	Pregnancy positive	Pregnancy negative		
Day 3	85 (23.6%)	288 (36.5%)	35 ± 4.0	373 (32.4%)
Day 5	275 (76.4%)	502 (63.5%)	33 ± 4.4	777 (67.6%)
Total	360 (100.0%)	790 (100.0%)	34 ± 4.2	1150 (100.0%)
<i>P-value</i>	0.000	0.000	0.24	

Table 3: Comparison between success ICSI and not success ICSI as regard to day 3 and day 5.

Table 4 shows distribution of success and not success ICSI according to age group. There was a significant difference ($p < 0.05$) between pregnant and non-pregnant according to age, out of the 360 women at different age gave success ICSI, there were 125 women (34.7%) had positive ICSI in age (18 - 28) years, whereas 203 (56.4%) were positive ICSI in age (29 - 39) years and women in age > 40 (8.9%) had positive ICSI.

Age	ICSI		Total
	Pregnancy positive	Pregnancy negative	
18 - 28 Years	125 (34.7%)	186 (23.5%)	311 (27.0%)
29 - 39 Years	203 (56.4%)	476 (60.3%)	679 (59.0%)
≥ 40 Years	32 (8.9%)	128 (16.2%)	160 (13.9%)
Total	360 (100.0%)	790 (100.0%)	1150 (100.0%)
<i>P-value</i>	0.000		

Table 4: Distribution of success ICSI and not success ICSI according to age group.

Table 3 shows percentage of success pregnancy as regard to day of ET, there were 85 women (22.7%) had success pregnancy in day 3 whereas 275 women (35.4%) had success pregnancy in day 5.

Table 3 shows distribution of population according to success rate in day 3, there was 85 women (23%) give success ICSI at day 3.

Table 3 shows distribution of population according to success rate in day 5, there were 275 (35%) women give success ICSI at day 5.

Discussion

Infertility or difficulty of conceiving is become a public health issue, it is estimated between 9% and 14% of couples in the developed world [8]. Routinely, these couples visit the specialized clinics for counseling, and they want to know the chance of having a live birth before they decide to go through any procedures of ART, that is because the ART procedures are more expensive here in Sudan [9].

Many studies conducted in developed countries to assess the success rates/outcomes of ICSI and the factors that affect the success [10,11]. There are few published data on the outcome of ICSI in countries with limited income and there is few published data on ICSI in Sudan.

The rationale of this study is to confirm that ET at blastocyst stage should be used to increase the probability of obtaining advanced normal embryos with the highest chance for survival.

Previous studies have indicated that ET at the blastocyst stage (day 5) yields better results than day 3 [12,13]. The findings of these studies are in accordance with our findings, so we found that 35% of ET at day 5 had got positive pregnancy, compared to 22% of ET at day 3. This indicates that ET at day 5 has better chance to have positive pregnancy test than ET at day 3. Other studies confirmed the better chance of ET at day 5 but with bigger percentage than our findings, they reported that pregnancy rates of up to 50% can be achieved by the transfer of day 5 when compared with embryo transfer at the cleavage stage or day 3 [14,15].

Our findings are in contrast with other recent published literature, it shows that, no statistically significant differences in terms of implantation rate and pregnancy rate when ET at day 5 when compared with day 3 [16].

Disadvantage of ET at day 3 could be related to inability to predict the outcome of the treated patients, studies reported that follow-up and assessment of day 2 or 3 transferred embryos may have limited predictive value for normal embryonic development [17].

It had been reported that age is an important predictor for having a successful outcome in ICSI [18] and it has been reported that age is the single most important predictor of success with ART and there is a natural decline in fertility with age due to normal decline of physiological functions [19,20]. The women included in this study were in age ranged between 18 to 48 years-old. The highest pregnancy rate was in group age of 29 to 39 years-old (56.4%) out of all positive pregnancy results, which is found to be in agreement with results of other studies [21,22]. Other study reported, the chance of achieving a successful pregnancy has been shown to be low in women aged ≥ 41 years [23]; this was also being in agreement with our results.

Limitation of the Study

Firstly, this study didn't discuss the prevalence of single and multiple pregnancies with regards to the stage of ET, that is important to be considered in further studies as reported by the National ART Surveillance System (NASS) for the year 2012 in the USA [24].

Secondly, this study didn't cover the information about live birth rates of day 3 and day 5 transfers to compare it statistically.

Conclusion

The present data suggests that day 5 embryo transfers provide better results than day 3 transfers. In addition to, there was probability to get success ICSI with younger 18-28 woman compare with woman > 28 years old.

Bibliography

1. Neri QV, *et al.* "Understanding fertilization through intracytoplasmic sperm injection (ICSI)". *Cell Calcium* 55.1 (2014): 24-37.
2. Vanden Meerschaut F, *et al.* "Assisted oocyte activation following ICSI fertilization failure". *Reproductive BioMedicine Online* 28.5 (2014): 560-571.
3. Yang S, *et al.* "The individualized choice of embryo transfer timing for patients with elevated serum progesterone level on the HCG day in IVF/ICSI cycles: a prospective randomized clinical study". *Gynecological Endocrinology* 31.5 (2015): 355-358.
4. Tiras B and Cenksoy PO. "Practice of embryo transfer: recommendations during and after". *Seminars in Reproductive Medicine* 32.4 (2014): 291-296.
5. Matorras R, *et al.* "Influence of the time interval between embryo catheter loading and discharging on the success of IVF". *Human Reproduction* 19.9 (2004): 2027-2030.
6. Staessen C, *et al.* "Comparison of blastocyst transfer with or without preimplantation genetic diagnosis for aneuploidy screening in couples with advanced maternal age: a prospective randomized controlled trial". *Human Reproduction* 19.12 (2004): 2849-2858.
7. Blake DA, *et al.* "The merits of blastocyst versus cleavage stage embryo transfer: a Cochrane review". *Human Reproduction* 19.4 (2004): 795--807.

8. Walschaerts M., *et al.* "Cumulative parenthood rates in 1735 couples: impact of male factor infertility". *Human Reproduction* 27.4 (2012): 1184-1190.
9. Ahmed M., *et al.* "Maternal age and intracytoplasmic sperm injection outcome in infertile couples at Khartoum, Sudan". *F1000 Research* 4 (2015): 1339.
10. Bhattacharya S., *et al.* "Factors associated with failed treatment: an analysis of 121,744 women embarking on their first IVF cycles". *PLoS One* 8.12 (2013): e82249.
11. McLernon DJ., *et al.* "Predicting the chances of a live birth after one or more complete cycles of in vitro fertilisation: population based study of linked cycle data from 113 873 women". *British Medical Journal* 355 (2016): i5735.
12. Gardner DK., *et al.* "Single blastocyst transfer: a prospective randomized trial". *Fertility and Sterility* 81.3 (2004): 551-555.
13. Papanikolaou EG., *et al.* "In vitro fertilization with single blastocyst-stage versus single cleavage-stage embryos". *New England Journal of Medicine* 354.11 (2006): 1139-1146.
14. Schwarzler P., *et al.* "Pregnancy outcome after blastocyst transfer as compared to early cleavage stage embryo transfer". *Human Reproduction* 19.9 (2004): 2097-2102.
15. Aziminekoo E., *et al.* "Pregnancy outcome after blastocyst stage transfer comparing to early cleavage stage embryo transfer". *Gynecological Endocrinology* 31.11 (2015): 880-884.
16. Levi-Setti PE., *et al.* "No advantage of fresh blastocyst versus cleavage stage embryo transfer in women under the age of 39: a randomized controlled study". *Journal of Assisted Reproduction and Genetics* 35.3 (2018): 457-465.
17. Neuber E., *et al.* "Sequential embryo assessment outperforms investigator-driven morphological assessment at selecting a good quality blastocyst". *Fertility and Sterility* 85.3 (2006): 794-796.
18. Vaegter KK., *et al.* "Which factors are most predictive for live birth after in vitro fertilization and intracytoplasmic sperm injection (IVF/ICSI) treatments? Analysis of 100 prospectively recorded variables in 8,400 IVF/ICSI single-embryo transfers". *Fertility and Sterility* 107.3 (2017): 641-648.
19. Spandorfer SD., *et al.* "Outcome of in vitro fertilization in women 45 years and older who use autologous oocytes". *Fertility and Sterility* 87.1 (2007): 74-76.
20. Tan TY., *et al.* "Female ageing and reproductive outcome in assisted reproduction cycles". *Singapore Medical Journal* 55.6 (2014): 305-309.
21. Al-Ghamdi A., *et al.* "The correlation between endometrial thickness and outcome of in vitro fertilization and embryo transfer (IVF-ET) outcome". *Reproductive Biology and Endocrinology* 6 (2008): 37.
22. Wu Y., *et al.* "Endometrial thickness affects the outcome of in vitro fertilization and embryo transfer in normal responders after GnRH antagonist administration". *Reproductive Biology and Endocrinology* 12 (2014): 96.
23. Choi HW., *et al.* "Effects of maternal age on embryo quality and pregnancy outcomes using testicular sperm with intracytoplasmic sperm injection". *Clinical and Experimental Reproductive Medicine* 43.4 (2016): 221-227.
24. Kissin DM., *et al.* "Embryo transfer practices and multiple births resulting from assisted reproductive technology: an opportunity for prevention". *Fertility and Sterility* 103.4 (2015): 954-961.

Volume 8 Issue 4 April 2019

© All rights reserved by Mohammed Rida.