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International Journal of Pharmaceutical Research & Allied Sciences, 2018, 7(3):166-171

Research Article

ISSN : 2277-3657
CODEN(USA) : IJPRPM

Association of Endometrial Thickness with Pregnancy Rate in Infertile Women Undergoing ICSI Program

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ABSTRACT

The fundamental element in effective outcome of In vitro fertilization is the endometrial receptivity. Clinically, it is checked by the evaluation of endometrial thickness with ultrasonography(U\S).
Aim: This prospective study aimed to study the endometrial thickness(ET) influence on the conception rate in infertile females treating with Intracytoplasmic Sperm Injection (ICSI). Approach: In this prospective study which was done in the Fertility center in AL- Sadr Medical City in An-Najaf governorate from October 2015 to December 2016, 45 ICSI cycles were contained. Endometrial thickness was evaluated in females undergoing an ICSI trial, on the day of HCG, using the ransvaginal ultrasound (TVU) probe. Infertile females have been classified into 2 subgroups; ≤ 8mm, and > 8 mm according to ET. The conception rates were compared between 2 groups. The maximal thickness from one interface of the endometrium to the interface of myometrium was checked.
Results: The women with endometrial thickness (≤8 mm) had less conception rate which was (23.50%), while those with endometrial thickness (>8 mm) had good conception rate which was (32.10%).
Conclusion: This study explained a significant association between endometrial thickness (ET) and conception rates after ICSI cycles.

Keywords: *Intracytoplasmic Sperm Injection (ICSI), infertility, endometrial thickness (ET), and clinical pregnancy*

INTRODUCTION

One of the most important measures for regular checking through in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) with embryo transfer (ET) cycle has been the endometrial valuation related to the good implantation and results. The predictive features affecting IVF–ICSI treatment, containing sub-endometrial blood flow, endometrial form, and endometrial thickness (EMT), have been called the endometrial parameters [1, 2, 3].

Close association of the blastocyst with the endometrial receptivity led to an effective implantation [4]. The more commonly and easily done noninvasive ultrasonography(U/S) has been routinely used to evaluate the endometrial receptivity representing the endometrial thickness, endometrial form, and endometrial and sub-endometrial blood flow [5, 6].

There have been changes in the endometrial structure occurring during the menstrual cycle after the stimulation with ovarian hormones which could be identified easily by ultrasound assessment [7]. In an IVF/ICSI cycle, hCG has been used as a substitute for the natural Luteinizing Hormone (LH)-surge to elicit the oocyte maturity. So, the endometrial assessment at HCG day administration has been of great value [8, 9].

The endometrial thickness (EMT) on the day of human chorionic gonadotropin (HCG) administration representing "the maximal echogenic distance between the junction of the endometrium and myometrium in the mid-sagittal plane" has been usually measured by transvaginal ultrasonography(TVU). Thin endometrium has been commonly related to lower pregnancy rates of IVF–ICSI cycles , in spite of an agreement on the fact that the exact definition of thin endometrium has been still absent [10] and the EMT cut-off standards have changed from(7–9) mm in prior studies [11].

Many new high quality meta analytic researches registered that thin endometrium disturbed the pregnancy rate in IVF [12, 13],

So, the goal of the current study was to estimate whether the analysis of EMT would improve the likelihood of clinical pregnancy following ICSI cycles.

MATERIALS AND METHODS

A prospective observational study at Fertility Center in Al-Sadr Medical City in An-Najaf governorate, was done on females who underwent ICSI from October 2015 to December 2016. The participants' demographics and characteristics were collected, like the ages of couples, their height, weight, body mass index(BMI), infertility period, number of past treated ICSI trials, and basal sex steroid hormone levels. Cycle day tow (CD_2) serum levels of follicular stimulating hormone (FSH), luteinizing hormone(LH), estradiol(E_2), and prolactin were evaluated. Serum level of (E_2) was assessed on the day of human chorionic gonadotropin (HCG) administration.

The exclusion criteria for the study involved failure of all oocytes to be fertilized, and also the cycles without the aspiration of follicles.

All the participants underwent controlled ovarian hyper-stimulation (with a long, short and antagonist protocol regimen) accordingly at cycle day 2, including single infusion of GnRH (a, Decapeptyl; 0.1 m.g.) which might have been administered subcutaneously waiting for the results of FSH, LH and E2, and serial ultrasonography which was done for the evaluation of follicular development, and the transvaginal egg retrieval following the injection of 10,000 IU of HCG.

Then, the process of ICSI was done with the husband's sperm according to the routine protocols at the center where the study was done. Endometrial thickness was evaluated in females undergoing an ICSI trial, on the day of HCG, using the transvaginal ultrasound (TVU) probe with a real time ultrasound device (Philips 11*E), using "vaginal probe (5-7 MHZ)". Infertile females have been classified into 2 subgroups; ≤ 8mm, and > 8 mm according to ET. The conception rates were compared between the 2 groups. The maximal thickness from one interface of the endometrial–myometrial junction to the other was checked. The measurement included both layers of the endometrium.

In the IVF lab, embryologists assessed the patients' embryos on day 3 following the retrieval, and the grading of each embryo was reported. The first outcome was the clinical conception, which has been defined as" the presence of fetal heart activity by ultrasound at 6-7 weeks' gestation".

Statistical Analysis:

The statistical analysis was done by using SPSS (statistical package for social sciences) version 20(2011). In which, mean, standard deviation, numbers and percentages were used as descriptive statistics. For analysis, chi square was used for categorical data, and the independent sample t-test was used for numerical variables. P value ≤0.05 was regarded significant.

RESULTS

A total of 45 women with infertility were included in this study.

The ICSI outcome of these women was 28.89% success, and 71.11% failure. The basic characteristics of patients have been shown in table 1.

Table1. Patients characteristics of studied groups (n=45)

Variables		Values
		mean±SD (range)
Age (years)		29.71±6.62 (18-45)
Body mass index (kg/m^2)		27.70±4.05 (19-35.7)
Duration of infertility (years)		8.40±4.16 (2-18)
Type of infertility	Primary	39/45(86.7%)
	Secondary	6(13.3%)
Etiology of infertility	Unexplained	18/45(40%)
	PCO	16(35.6%)
	Tubal	2(4.4%)
	More than one cause	5(11.1%)
	Others	4(8.9%)
Hormonal assay	Basal E2(Pg/ml)	39.53±14 (0.45-74.73)
	Basal FSH (mIU/ml)	6.57±3.65 (0.1-23.24)
	LH (mIU/ml)	3.44±1.58 (0.1-7.1)
	E2 at day of hCG injection(pg/ml)	1924.57±788.4 (407.22-3029.9)
Treatment protocols	Short	27/45(40%)
	Long	3/45(6.7%)
	Antagonist	15/45(33.3%)
No. of ICSI cycle attempts	First attempt	37/45(82.2%)
	≥2 attempts	8/45(17.8%)

Data expressed as mean±SD, range, number and percente

Table 2. Relationship between endometrial thickness and ICSI hormones

Hormones	Endometrial thickness (mm)		P value
	≤ 8(n=17)	**> 8-16(n=28)**	
Basal E2 (ng/ml)	43.41±15.7	37.15±12.5	0.162
Basal FSH (ng/ml)	6.72±2.43	6.48±4.29	0.833
Basal LH (ng/ml)	3.58±1.47	3.35±1.67	0.655
E2 at day of HCG (ng/ml)	2321.6±628	1674.5±785.6	0.006

Table 2 shows no significant difference in hormones except E2 at the day of HCG which was significantly higher in those with less than or equal 8 mm endometrial thickness.

Table 3. Major ICSI outcomes in different thickness of endometrium.

Variable	Endometrial thickness (mm)		P value
	≤8 (n=17)	**>8 (n=28)**	
Follicle count	15.1±5.3	14.8±6.8	0.894
Retrieved oocyte.	10.4±4.1	10.9±6.9	0.784
Egg at M II	7.76±3.6	7.72±4.7	0.974

Number of injected oocyte	8.25±3.49	7.28±4.7	0.486
2PN	4.16±1.8	4.13±3.05	0.975
Fertilization rate	59.65±22.9	59.41±30.8	0.982
Number of Embryo	4.81±2.85	4.52±3.14	0.746
Cleavage rate	97.39±19.04	91.06±24.78	0.329
Grade 1	2±1.1	2.2±2	0.793
Grade 2	3±2.85	2.85±1.89	0.847

Table 3 shows no significant difference in ICSI outcome between those with less than or equal 8 or more than 8 mm endometrial thickness.

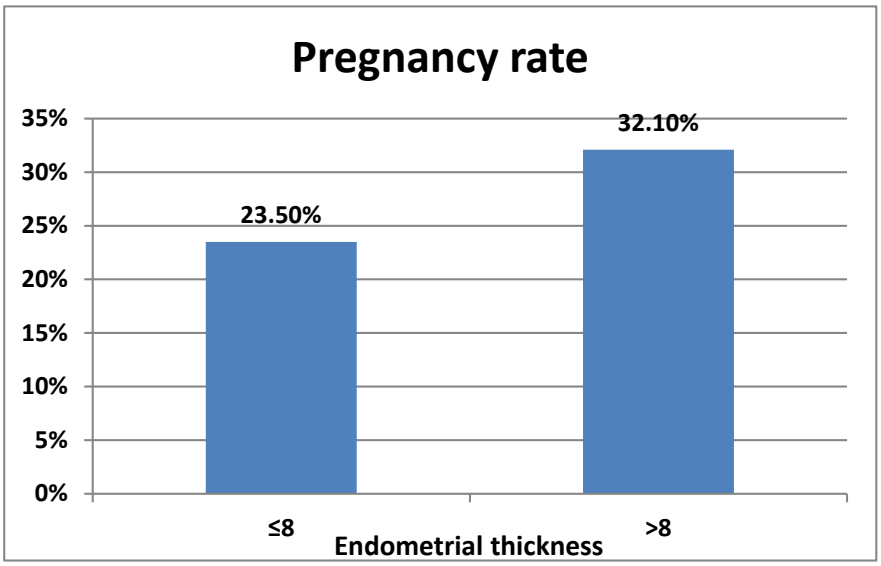

Figure 1. Effect of endometrial thickness on pregnancy rate in female undergoing ICSI programme (p>0.05)

There was no significant association between endometrial thickness and success rate in spite of the fact that it was higher in those more than 8 mm as shown in figure 1.

DISCUSSION AND CONCLUSION

This study's outcomes agreed with the studies that discovered a good conception rate with the high endometrial thickness [14, 15, 16]. This strong association between endometrial thickness and conception gave an indication to propose that endometrial thickness is a good pointer for endometrial receptivity. While there was a disagreement with other studies that have explained that a least endometrial thickness of 6 mm is suitable for implantation [17, 18, 19]. The outcomes of this study suggested that the clinical conception was the peak for the patients with the thickest endometrium, and these findings were more consistent with the results of other studies that found no reduction in pregnancy rates with very thick linings [20, 21, 22, 23].

The decreased conception rate was associated considerably with both increasing age and basal FSH. Also, the increasing basal LH was significantly linked with decreased numbers of mature oocytes and poor outcomes, and the high FSH/LH ratio was related to lower mature oocytes. The high levels of E2 (>75pg/ml) and advanced age had more specificity. The high FSH/LH ratio in the start of the cycle might be essential for the quality of the eggs, and a poor result was expected in females undergoing controlled ovarian stimulation for IVF cycle [24]

Because most of the cases of the current study were obese and polycystic, the levels of hormones were high which agreed with the results of the studies which were done by [25, 26, 27, 28].

The continuous checking with TV/US for endometrial thickness changes happening through the ovarian stimulation can help the providers in advising patients and expecting ICSI cycle success. The endometrial response and receptivity have been still difficult to be predicted, but the increase in the endometrial response appeared to be a predictor for better ICSI outcomes.

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