



Correlation Between Endometrial Thickness and Pregnancy Outcome in Iraqi Women Undergoing ICSI

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During the process of embryo development, endometrial receptivity is very important for the successful implantation of blastocysts. This research investigated the influence of endometrial thickness on the day of oocyte retrieval and fresh embryo transfer on pregnancy outcomes in Iraqi women who are undergoing intracytoplasmic sperm injection (ICSI). Women from Iraq are taking part in this investigation. Participating in in vitro fertilization (IVF) cycles with the use of ICSI was a group of 44 women who were diagnosed with polycystic ovarian syndrome (PCOS) and had unexplained infertility. During the phases of oocyte retrieval and embryo transfer, there were significant differences seen between the two groups (p-values of 0.003 and 0.049), respectively. There was a total of 44 individuals, and 31 of them had negative pregnancy test results. The remaining 13 persons had positive findings. These results illustrate the importance of endometrial thickness in influencing the effectiveness of assisted reproductive technologies in achieving pregnancies.

ABSTRACT

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KEYWORD

Endometrium Thickness, Embryo Transfers, Oocyte Pickup, ICSI

1. Introduction

Embryonic implantation into the endometrium is a pivotal step in establishing a healthy pregnancy, contingent on two essential prerequisites: a competent embryo and a receptive endometrium. The endometrial receptivity is confined to a specific time frame known as the implantation window (IW) (Enciso et al., 2021[1]). Typically, this window spans three to six days during the secretory phase, occurring from day 20 to day 24 of a standard 28-day menstrual cycle (Lessey & Young, 2019[2]). During this window, the endometrial epithelium undergoes significant changes, such as the loss of microvilli on the plasma membrane and the development of pinopodes, which are apical surface protrusions. The presence of pinopodes during the luteal phase signifies the endometrium's readiness for embryo implantation (Kozyra et al., 2023[3]). Following fertilization in the fallopian

tube, the embryo undergoes cleavage divisions and transforms into a blastocyst upon leaving the oviduct. Subsequently, the blastocyst attaches to the uterine wall, initiating further development. This attachment process is termed implantation (Meena, 2016[4]). Implantation unfolds in three stages: apposition, initial adhesion (which is unstable), steady adhesion, and invasion, which occurs in two distinct phases. The 'first phase' of trophoblast invasion takes place soon after the blastocyst exits the zona pellucida, usually between days 7 and 10 post-conception. Following this, the embryo begins to penetrate the uterine tissue. By day 10 post-conception, the embryo is deeply embedded within the uterine lining (Ng et al., 2020[5]). Over the past two decades, Assisted Reproductive Technology (ART) has become the standard approach to treat infertility. It is crucial to examine the variables impacting success in these individuals because of the high cost,

low implantation success rate, and high risk of multiple pregnancies associated with in vitro fertilization (IVF) cycles. In this regard, the endometrium's receptiveness is of essential importance' (Al-Ghamdi et al., 2008[6]; Momeni et al., 2011[7]).

The outcome of IVF is contingent upon the quality of both the embryos and the endometrium during the implantation period (Bassil, 2001[8]). The midsagittal plane of transvaginal ultrasound measurements has become the standard for measuring endometrial thickness, an indirect indication of endometrial receptivity (Al-Ghamdi et al., 2008[6]). It is still difficult to determine whether or not an endometrium is receptive while using ART. Ultrasound examinations are now a standard element of assisted reproductive technology (ART) procedures, providing a non-invasive, accurate method of diagnosis (Zhao et al., 2012[9]). In order to investigate any possible association between

endometrial thickness and the success of in vitro fertilization, we assessed it in this research on the days of embryo transfer and oocyte retrieval.

2. Patients and Methods

In this cross-sectional study, a total of 44 infertile women aged between 18 and 42 years were included. Women with polycystic ovary syndrome or unexplained infertility were recruited from the In Vitro Fertilization (IVF) center at Iraq's Al-Nahrain University's High Institution for Infertility Diagnosis and Assisted Reproductive Techniques to take part in the study. Between October 2022 and April 2023, researchers at Al-Nahrain University's High Institution for Infertility Diagnosis and Assisted Reproductive Techniques performed the study after receiving clearance from the institution's local medical ethics committee. All patients who took part in the study gave their informed permission. Women with a history of unilateral oophorectomy, women over

the age of 43, people with other endocrine diseases, thyroid disorders, autoimmune diseases, and people with conditions like endometriosis, uterine fibroids, hydrosalpinx, and adenomyosis were all ruled out.

Ovarian Stimulation and Oocyte Retrieval:

Every individual who underwent Intracytoplasmic Sperm Injection (ICSI) was administered a gynecologist-recommended ovarian hyperstimulation protocol. On the second day of the menstrual cycle, this protocol entailed the administration of gonadotropin (r-FSH), wherein each ampoule contained 75 IU of r-FSH activity. In consideration of the patient's age, Body Mass Index (BMI), and previous response to ovulation induction, the dosage was modified. Follicle size was assessed using ultrasonography and serum E2 levels. A GnRH antagonist was utilized to induce pituitary gland downregulation when follicles attained a diameter of 14

mm. The administration of cetrorelix acetate and r-FSH (0.25 mg per day) persisted until the day of the ultimate oocyte maturation stimulus. A subcutaneous injection of 250 µg (equivalent to 6500 IU) of human chorionic gonadotropin was administered to induce ovulation when at least two follicles had grown to a diameter of 16-18 mm. Subsequently, Progesterone therapy (cyclogest® 200-400 mg trans-vaginally twice daily) was administered to all ICSI patients from the day of oocyte retrieval until the pregnancy test, which was performed 12-14 days after luteal phase support and persisted for a duration of 12 weeks during gestation. In order to verify pregnancy, vaginal ultrasound examinations were conducted 6-7 weeks after embryo transfer (Dashti and Eftekhari, 2021[10]).

Ultrasound Measurement:

On the day of oocyte retrieval and embryo transfer, the endometrial thickness was assessed by a medical

professional via transvaginal 8 MHz ultrasonography with Doppler Ultrasound (Medison®, Seoul, South Korea, SonoAce-X6, 6MHz).

Statistical Analysis

For the present cross-sectional study, statistical analysis was carried out using GraphPad Prism ver.7 and Microsoft Excel 2016. The presentation of numerical data involved the description of medians and 95th percentiles, while categorical data were expressed as counts and percentages. To compare between two groups, the Mann-Whitney U test was employed. The threshold for the accepted level of statistical significance was set at or below 0.05. Additionally, Spearman correlation analysis was utilized to estimate the correlation between each variable, following the methodology outlined by (Elliott & Woodward in 2007[11]). This method allowed for the examination of potential relationships between different variables in the dataset.

2. Results

Distribution of Demographic Characteristics for the Study Population:

The findings of the present study revealed that among the study population, 36 out of 44 patients (81.82%) experienced primary infertility, whereas the remaining 18.18% had secondary infertility, as illustrated in Figure 1. Furthermore, Figure 2 demonstrates that out of the total participants, 31 patients out of 44 (70.45%) had a negative pregnancy outcome, while 13 patients out of 44 (29.55%) achieved a positive pregnancy outcome. Table 1 presents a comparison of endometrial thickness measures between pregnant and non-pregnant women. Significant differences were observed between these two groups on both the day of oocyte retrieval and the day of embryo transfer, with measurements of 9.4 mm versus 8.4 mm and 9.6 mm versus 9.3 mm (p-value = 0.003 and 0.049),

respectively. These findings suggest that endometrial thickness may play a role in distinguishing between pregnant and non-pregnant outcomes in the

context of assisted reproductive techniques.

Table (1): Comparison between pregnant and non-pregnant women in endometrium thickness

Endometrium Thickness/ (mm)			Pregnancy test		p-value
			Positive	Negative	
pick up day	Median	8.5	9.4	8.4	0.003*
	Percentile 05	7.2	7.2	6.5	
	Percentile 95	11.5	12	11	
Embryo transfers day	Median	9.4	9.6	9.3	0.049*
	Percentile 05	7.8	9	7.5	
	Percentile 95	12.3	12.5	11.5	

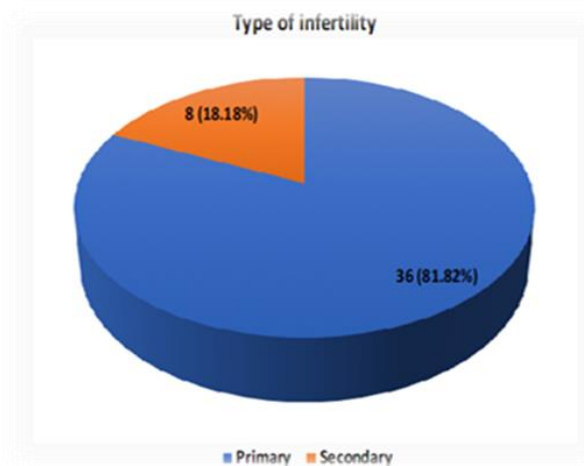


Figure (1): Statistics showing the prevalence of each form of infertility in the studied population.

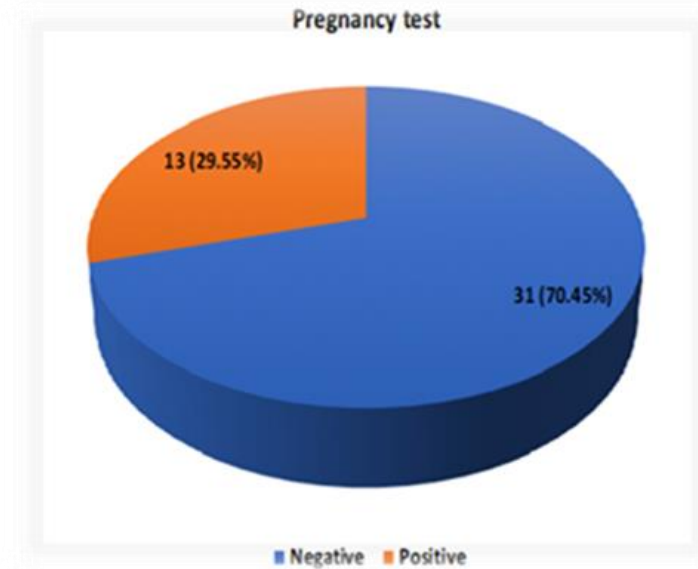


Figure (2): Characteristics of the sample population and the proportion of each type of pregnancy result.

4. Discussion

On the day of pickup and the day of embryo transfer, there was a statistically significant difference in endometrial thickness between the pregnant and non-pregnant groups (p-value = 0.003, 0.049). There is a higher chance of getting pregnant when the endometrium is thicker (Kovacs et al., 2003[12]). The thickness of the endometrium during fresh IVF cycles was a better indicator of endometrium

receptivity than the thickness of the endometrium during a frozen embryo transfer (FET) cycle (Zhang et al., 2018[13]). The endometrial thickness increased or stayed the same on the day of embryo transfer after progesterone administration compared to that on the day of progesterone administration. However, an endometrial thickness of less than 6 mm was linked to a dramatic decrease in live birth rates in both fresh and frozen embryo transfer

cycles (Mahutte et al., 2022[14]). These findings are consistent with previous research demonstrating the important role the endometrium plays in a pregnancy's prognosis.

5- Conclusion

the present study's results are consistent with existing literature, collectively reinforcing the significance of endometrial thickness as a critical factor influencing pregnancy outcomes in assisted reproductive techniques. These findings emphasize the importance of monitoring and optimizing endometrial thickness in the management of infertility treatments.

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FAuthor Contribution

Rwuidh Ibraheem performed the study, and Lubna A. Al-Anbari, Rehab Sh. Al-Maliki supervised the work .

Conflict of Interest

The authors declare no conflict of interest .

Ethical Clearance

The study was approved by the Ethical Approval Committee.

Financial Disclosure

There is no financial disclosure.

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