

## Original Article

# A Retrospective Observational Study : To Study the Correlation of Endometrial Thickness *versus* Endometrial Pattern on Implantation in North Indian Females

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**Background :** To evaluate the relationship of endometrial thickness and endometrial pattern on implantation of transferred embryos in autologous and donor cycle.

**Design :** Retrospective study.

**Materials and Methods :** Patients (n=1081), age 21-40 years, autologous as well as donor embryo transfers performed between July, 2015 to February, 2022.

**Intervention :** Endometrial thickness and endometrial pattern measured on trigger day and embryo transfer day by Ultrasonography (TVS)

**Results :** A total of 530 gestational sacs, 441 pregnancies and 134 clinical pregnancies resulted from 1251 cycles. Endometrial thickness varied from 4mm-13mm in clinically positive pregnancies. No particular thickness seemed associated with positive pregnancy cases. Endometrial pattern II & III were seen to be associated with maximum positive cases. Endometrial pattern I was associated with lower pregnancy rates.

**Conclusions :** Endometrial thickness seems having less correlation with the pregnancy outcome. Endometrial pattern is more important factor for conception. Endometrial pattern II & III seems having a correlation with implantation rate.

**Support :** Endometrial pattern, but not thickness, affects implantation rates in euploid embryo transfers (fertility and sterility Vol 104, No 3 September, 2015).

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**Key words :** Endometrial thickness, Endometrial pattern, Implantation, Pregnancy.

Infertility is a major contributory factor that affects public health, distressing both men and women. As per WHO data, infertility is perceived to be a public health problem once its frequency surpasses 15%<sup>1</sup>.

If even after detailed screening tests any causative aetiology of infertility has not been found, it is classified as "unexplained infertility".

After being treated 18.5% of these patients will remain unable to conceive. Thus, it is noteworthy that presently available diagnostic tests are insufficient to assess the causes behind unexplained infertility<sup>2</sup>.

Once preliminary treatment modalities fail to bring intended results, couples may opt for Assisted Reproductive Technology (ART)

Although Ovarian stimulation practices have

### Editor's Comment :

- Endometrial receptivity plays a crucial role in the successful implantation of an embryo.
- The triple-layer pattern of the endometrium serves as an indicator of its receptivity.
- Even if the endometrium is sufficiently thick, its receptivity may still be compromised if the pattern is inadequate.

upgraded aggressively and enabled us to obtain plenty of mature oocytes as well as embryos for transfer, percentage of successful IVF has not improved proportionally<sup>3</sup>. Hence, successful implantation as well as endometrial receptivity is to be focused upon<sup>4</sup>. Implantation still is one of the foremost limiting parts in the field of ART & implantation is ultimately dependent upon endometrial receptivity<sup>2,7</sup>.

Endometrial receptivity can be assessed by its pattern and thickness to some extent, apart from color flow studies of endometrium by Trans Vaginal Sonography (TVS).

### MATERIAL AND METHODS

Total 1081 patients were included in the study. 1251 cycles of IVF/ICSI/ET/IUI were carried out during July, 2015 till February, 2022 at Teerthanker Mahaveer Medical College & Sparsh IVF centre.

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### Inclusion Criteria :

- Age <40 years with history of infertility, might be primary or secondary infertility, married for at least 2 years, sexually active.
- Normal size and shape of the uterus without any structural anomaly as evidenced by Trans Vaginal Ultrasound or Hysterography.
- Endometrial thickness <7 mm on day 14 of menstrual cycle.
- Able to attend follow up as per schedule.
- No known chronic medical illness.
- Gave Informed consent.

### Exclusion Criteria:

- Patients having any endocrine disease.
- History of prior hysteroscopic surgeries.
- Congenital uterine anomaly, myoma, adenomyosis etc.
- Severe hepatic, renal or cardiovascular impairment
- Smokers.

Endometrial thickness and pattern of all the participating patients was noted by TVS on the day of embryo transfer or IUI - using by a Siemens S2000 scanner with a transvaginal multifrequency probe.

According to Endometrial thickness, patients were classified into type I, II, III TYPE of endometrium.

Type I :  $\leq 7$  mm

Type II :  $> 7$  mm to  $\leq 14$  mm

Type III :  $> 14$  mm.

According to endometrial pattern, patients were classified into GROUPS.

A : Triple-line pattern consisting of a central hyperechoic line surrounded by two hypoechoic layers.

B : An intermediate isoechogenic pattern with the same reflectivity as the surrounding myometrium and a poorly defined central echogenic line.

C : Homogenous, hyperechogenic endometrium.

### Statistical Analysis :

Data was entered into predesigned proforma and was updated accordingly in Microsoft Excel sheet for analysis. Nominal data were expressed in numbers and percentage whereas for the normally distributed continuous variables, the data were given as Mean  $\pm$  Standard Deviation. 't' test and ANNOVA tests were utilized as tests of significance. P value  $\leq 0.05$  was regarded as statistically significant.

### Demographic Characteristics :

For this study, a total of 1085 patients with infertility were evaluated during designated study period.

Table 1 shows distribution of patients who were

enrolled in the study according to age. The patients' age ranged from 20 to 40 years with majority of patients belonging to 26-30 years age group.

Age (years)	No of women	%
20-25	156	14.4
26-30	380	35.1
31-35	216	20.0
36-40	329	30.4

Table 2 displays the distribution of types of infertility. In my study, majority of patients had primary infertility. 65%

Primary	65%
Secondary	35%

patients had primary infertility whereas 35% patients came with secondary infertility

### OBSERVATION AND RESULTS

The patients having type II & III endometrium, had maximum implantation rates. It is the pattern, which is more important rather than thickness, as pregnancies have occurred in up to 4.6 mm thick endometrium.

### DISCUSSION

Endometrial receptiveness is decisive for successful implantation. An endometrium that has thickness of  $< 7$  mm on the day of ovulation is regarded as thin<sup>7</sup>. Endometrial thickness and pattern are self-determining parameters that influences pregnancy consequences and a thin endometrium is a negative predictive factor for pregnancy in itself with or without ovarian stimulation<sup>5-7</sup>.

Concerning endometrial thickness and pattern, Al Mohammady, *et al*<sup>8</sup> evaluated 100 women with infertility on ICSI cycles, he recorded the Ed Th as well as endometrial pattern on the day of HCG administration and afterwards Clinical Pregnancy Rate (CPR) was computed, after analysing the results, trilaminar pattern exhibited the maximum occurrence of pregnancy. Scrutiny of pregnancy rate with relation to different endometrial patterns and Ed Th set gave away the fact that trilaminar pattern with an Ed Th of 10-12.9 mm results in maximum CPR, so they concluded that Ed Th of 10-12.9 mm with trilaminar pattern is associated with higher clinical pregnancy during ICSI cycles. In our study although CPR was not a parameter, Chen, *et al*<sup>9</sup>, after thoroughly analysing 2896 fresh IVF/ICSI cycles utilizing long protocol and calculating Ed Th and assessing endometrial pattern with TVS on the day of HCG administration deliberated that collective assay of Ed Th and pattern on the day of HCG injection, rather than separate evaluation of a parameter was a more reliable prognosticator of the IVF/ICSI-ET results.

Table 3 — Percentage of Pregnancies of achieved in various patterns of Endometrium

Group	Pattern A	B	C	P
I	11.1% (3/27)	6.9% (3/43)	22.2 % (4/18)	NS
II	40% (351/871)	33.1% (258/779)	25.1% (37/147)	<0.05
III	31.7% (70/221)	35.7% (35/98)	33.3 % (5/15)	NS
P	<0.05	<0.01	NS	

### CONCLUSION

Our study shows, if the endometrium is type II or type III pattern, it is the favourable feature to conceive. Conception occurs in thin endometrium (up to 4.6 mm) if the pattern of endometrium is good.

### Ethical Clearance :

The study was approved by Institutional Ethical Committee.

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