Effect of endometrial biopsy on intrauterine insemination outcome in controlled ovarian stimulation cycle

Leena Wadhwa, Amrita Pritam, Taru Gupta, Sangeeta Gupta, Sarika Arora[1], Rajkumar Chandoke[2]

Departments of Obstetrics and Gynecology, [1]Biochemistry and [2]Pathology, ESI-Post Graduate Institute of Medical Science and Research, Basaidarapur, New Delhi, India

Address for correspondence:
Dr. Leena Wadhwa, Flat No. 225, Sector-9, Pocket-1, DDA/SFS, Dwarka, New Delhi - 110 075, India.
E-mail: drleena_123@yahoo.co.in

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ABSTRACT

OBJECTIVE: The objective was to evaluate the effect of endometrial biopsy (EB) on intrauterine insemination (IUI) outcome in controlled ovarian stimulation (COS) cycle. **DESIGN:** Prospective randomized control study. **SETTING:** Tertiary care center. **MATERIALS AND METHODS:** A total of 251 subjects were enrolled in the study. Subjects undergoing COS with IUI were randomly allocated into three groups. Group A: EB was taken between D19 and 24 of the spontaneous menstrual cycles that precedes the fertility treatment and IUI, which was done in next cycle (n = 86). Group B: EB was taken before D6 of the menstrual cycle, and fertility treatment and IUI was done in the same cycle (n = 90). Group C: (control group) no EB in previous 3 cycle (n = 75). **MAIN OUTCOME MEASURE:** Clinical pregnancy rate (CPR). **RESULTS:** Clinical pregnancy rate was 19.77%, 31.11%, and 9.3% for Group A, Group B, and Group C, respectively. The results show a highly significant value for the paired t-test of intervention Group B and control Group C of the cases (P = 0.000957). CPR was maximum after first cycle of ovulation induction and IUI following EB scratch in both Groups A and in Group B ($P < 0.001$). **CONCLUSIONS:** Endometrial biopsy done in early follicular phase in the same cycle of stimulation with IUI gives better CPR as compared with EB done in the luteal phase of the previous cycle.

KEY WORDS: Assisted reproductive technology, controlled ovarian stimulation, endometrial biopsy, intrauterine insemination

INTRODUCTION

It is generally accepted that successful implantation depends on the quality of blastocyst, a receptive endometrium and the synchronization between the developmental stages of the embryo and endometrium. This dynamic process involves coordinated effects of autocrine, paracrine, and endocrine factors. For the implantation to occur, a genetically normal blastocyst should hatch, appose, adhere, penetrate, and finally invade a well-synchronized endometrium, under the influence of estrogens and progesterone.[1] The time period during which the uterine environment is conducive to blastocyst implantation is called the window of implantation. In the natural cycle during this period, the uterus is prepared to receive a blastocyst and support further implantation through mediation by immune cells, cytokines, growth factors, chemokines, and adhesion molecules.[2] Several mechanisms are believed to play a role in improving the outcome. After endometrial injury, cytokines that are released during the repair process induce endometrial changes favorable for implantation. Endometrial injury also induces decidualization, which favors implantation as well. Uterine receptivity is diminished in controlled ovarian stimulation (COS) cycle

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compared with the natural cycle. In assisted reproduction technique, COS induces lower implantation rate than natural or ovum donation cycle suggesting suboptimal development due to the abnormal endocrine and paracrine milieu. The healing after the injury slows endometrial development, which is otherwise accelerated after stimulation, thereby increasing the likelihood for an in-phase[3] endometrium at the time of transfer. The effectiveness of this intervention has been evaluated in various studies done in *in vitro* fertilization (IVF) cycle. Barash *et al*.[4] suggested a significant doubling of the implantation, clinical pregnancy, and live birth rates in cases who underwent repeated endometrial biopsies in the cycle immediately preceding the IVF. The Cochrane review[5] (2012) found the benefit when endometrial injury was done in the luteal phase of the preceding cycle. Subsequently better implantation rates after local injury to the endometrium were reported by others like Raziel *et al*.[6] Zhou *et al*.[7] Karimzadeh *et al*.[8] and Narvekar *et al*.[9] There is a heterogeneity in the method, timing and frequency of endometrial biopsy (EB) in various studies. Karimzade *et al*.[10] used Novak curette. Pipelle was used by various studies.[4,6,8,9] EB catheter was used in few studies.[7,11] Various other studies used hysteroscopy as a method for creating injury.[12,13] Various authors have done EB in the luteal phase of the preceding cycle of stimulation.[6,8] In a few studies[7,14] EB has been done either in the follicular phase of preceding cycle of stimulation or in the same cycle of stimulation in the follicular phase.[11,15] There was even difference in number of times EB was done. None of the studies have tried this intervention in intrauterine insemination (IUI) which is one of the most applied treatment options for couples with infertility for various reasons. IUI is mainly done in couples with longstanding subfertility caused by either hostile cervix, a male factor, or by unexplained infertility.[16] The proposed hypothesis in our study is that EB preceding ovulation induction (OI) and IUI have the same beneficial effect on IUI outcome in patient undergoing COS as demonstrated in IVF through local inflammatory and angiogenesis mechanism.

Aims and objectives

The aim was to evaluate the effect of EB on IUI outcome in COS cycle and to compare differences in IUI outcome by EB in follicular and luteal phase of the cycle.

MATERIALS AND METHODS

This is a prospective parallel randomized control study in a 1:1 allocation ratio conducted in the Department of Obstetrics and Gynecology, at a tertiary care center from August 2012 to March 2014. The ethical committee approval was taken before beginning the study. This study has also been registered under clinical trial registration India. This trial was conducted for limited time period as it was a part of thesis project. The women attending the infertility clinic who were planned for COS with IUI were included in our study. Complete infertility workup of all cases was done including husband semen analysis, infection screening of both the partners and investigations for tubal patency.

Inclusion criteria were women with age 18–38 years with primary or secondary infertility and with both or either one of the patent tubes (hysterosalpingography/laprohysteroscopy). Women with known pelvic inflammatory disease with bilateral tubal blockage, severe male factor infertility with intrauterine pathology (submucosal fibroid, endometrial polyp, adhesions) and women with acute vaginal and cervical infection were excluded.

Primary outcome

Clinical pregnancy rate (CPR) (ultrasound confirmation of a gestational sac).

Secondary outcome

- Miscarriage
- Multiple pregnancies.

A total of 251 subjects fulfilling the inclusion criteria were enrolled in the study. At the recruitment written informed consent was taken from each woman. Each case was subjected to a detailed history and thorough clinical examination according to prescribed proforma. Physical examination was performed including general physical examination, systemic, abdominal and gynecological examination.

Assuming the CPR in intervention and control Group as 32.7% and 13.7% in the previous study by Narvekar *et al*.[9] with alpha = 0.05 and power = 80% minimum 225 cases were to be included, but assuming that few subjects may be lost to follow-up, a total of 251 subjects attending infertility clinic were included in the study. Eligible subject undergoing COS with IUI were randomly allocated into 3 Groups.

Block randomization with sealed envelope system was used. The random allocation sequence was generated using random number table. The allocation was done by the doctor posted in infertility outpatient department (OPD).

- Group A: (Intervention group) subjects were advised abstinence. EB was taken using endometrial aspiration cannula any day between day 19 and day 24 of the spontaneous menstrual cycles that precedes the fertility treatment and IUI, which was done in next cycle (n = 86)
- Group B: (Intervention group) EB was taken using endometrial aspiration cannula before day 6 of the menstrual cycle, and fertility treatment and IUI was done in the same cycle (n = 90)

- Group C: (Control group) No EB in previous 3 cycle (n = 75).

Endometrial biopsy was taken using endometrial aspiration cannula by the same investigator. We used endocell of Wallach surgical devices Trumbull, CT 06611 (203) 799–2005 made in USA. Each patient underwent single IUI 36 h after human chorionic gonadotropin (HCG) trigger or 24 h later if luteinizing hormone surge was positive irrespective whether the follicle was ruptured or not on ultrasound study. Male subfertility was considered according to WHO 2010 semen analysis criterion.

The study was not blinded, and all due care was taken during randomization to prevent selection bias. Funds for this trial were generated from the Institute where it was performed.

RESULTS

Statistical analysis was performed using statistical software IBM SPSS. The basic demographic profile was comparable in both the groups with similar age groups, rate of primary and secondary infertility. The majority of cases in our study had unexplained infertility [Table 1]. The duration of infertility was in the range of 5–8 years in 40.7% women in group A and 40% in group B and 36% in group C.

In Group A, out of 86 cases who had undergone EB in the luteal phase in Group A, 11 cases did not report for OI and IUI the remaining 75 cases received OI. In Group B, all 90 cases who underwent EB in the follicular phase received OI. In Group A, CPR was 16.6% with clomiphene citrate (CC), 17.2% with CC + HCG, 40% with CC + human menopausal gonadotropin (HMG) + HCG. In Group B, CPR (68.4%) was significantly higher with P = 0.045 in women receiving CC without HCG trigger and CPR was 20.8% with CC + HCG, 22.2% with CC + HMG + HCG. In Group C, CPR was 25% with CC, 6.8% with CC + HCG, 11.1% with CC + HMG + HCG. Although pregnancy rate was high with CC + HMG cycle in Group A, but it was not statistically significant.

Maximum cases were with 7-9 mm endometrial thickness (ET) on the date of HCG trigger with 42.7% in Group A, 45.3% cases in Group B and 29.3% in Group C, respectively. Mean ET was 7.54 ± 1.55 mm, 8.4 ± 1.84 mm, and 7.4 ± 1.8 mm in Group A, B and C, respectively, Endometrial thickness obtained on day of HCG trigger was significantly high in Group B (P = 0.002). Minimum ET was 4.9 mm, 5.1 mm and 4.7 mm in Group A, B and C, respectively. Maximum ET was 13.1 mm, 13.3 mm and 13.3 mm in Group A, B and C, respectively [Table 2].

Pregnancy rate was maximum in cases when EB done on D22 (38.9%) of cycle but it was not statistically significant. In the luteal phase, the mean day for taking EB in Group A was 21.7 ± 1.46 Pregnancy rate was significantly more (32.1%) when EB was done on D2 with P value (0.001). Mean day for EB in the follicular phase was 2.14 ± 0.68.

Clinical Pregnancy was maximum after first cycle of OI and IUI following EB scratch in both Groups A (22.5%) and in Group B (76.5%).It was significant with $P < 0.001$ [Table 3].

Endometrial biopsy was done in all 86 cases enrolled in Group A in the luteal phase; 11 women did not come in next cycle for OI with IUI. 3 women out of 11 conceived spontaneously in next cycle after EB. In Group B, EB was done in all 90 cases enrolled in Group B in early follicular phase followed by OI in all cases. 15 cases who received OI in Group B did not report for IUI. 12 out of 15 cases conceived [Consort Flow Diagram]. Taking into consideration intention to treat analysis all the cases enrolled in Group A and B were analyzed CPR was 19.77%, 31.11%, and 9.3% for Group A, Group B, and Group C, respectively. The paired t-test was used to compare each two individual Group means. The results show a highly significant value for the paired t-test of intervention Group B and control Group C of the cases (P = 0.000957). No significant value was present (P = 0.077) for the Group A and the control Group C. No significant value was present between the Group A and B of cases (P = 0.119). Overall pregnancy was significantly higher in intervention Group B as compared to control Group C (P = 0.0026). The risk of multiple pregnancy

Table 1: Demographic profile and causative factors

	Group A (n=86) (luteal phase EB group)	Group B (n=90) (follicular phase EB group)	Group C (n=75) (control group)
Age (years)	27.08±4.18	26.71±3.88	27.98±4.20
BMI	22.42±1.37	21.95±1.36	22.62±1.50
Primary infertility (%)	69.8 (n=60)	70 (n=63)	57.3 (n=43)
Secondary infertility (%)	30.2 (n=26)	30 (n=27)	42.7 (n=32)
Ovulatory dysfunction (%)	36 (n=31)	20 (n=18)	23.9 (n=18)
Tubal factor (%)	12.8 (n=11)	7.8 (n=7)	8 (n=6)
Male factor (%)	8.1 (n=7)	12.2 (n=11)	8 (n=6)
Combined (%)	1.2 (n=1)	6.7 (n=6)	13.4 (n=10)
Unexplained infertility (%)	41.9 (n=36)	53.3 (n=48)	46.7 (n=35)

BMI=Body mass index; SD=Standard deviation; EB=Endometrial biopsy

and abortion was statistically insignificant in all the three Groups [Table 4].

DISCUSSION

Several interventions have been proposed to improve endometrial receptivity. Scratching of endometrium has been suggested to improve implantation and CPRs. It has been observed in various meta-analysis[5,17-19] that local endometrial injury (LEI) produced using hysteroscope or biopsy catheter in preceding or same cycle of ovarian stimulation is a reasonable procedure to improve reproductive outcome for women undergoing ART (IVF/intracytoplasmic sperm injection [ICSI]) particularly for women with previous unsuccessful embryo transfer. This procedure has also been tried in women undergoing first ART cycle with successful results. Barash *et al*.[4] emphasized the possible role of endometrial injury on improved implantation and pregnancy rates in ART cycle. There is current need to examine the effect of this intervention in non IVF/ICSI situations like women undergoing COS cycles with IUI. Our study was undertaken to evaluate the effect of EB on IUI outcome in COS cycle and to compare the effect of EB done in the luteal phase or follicular phase with the cycle outcome.

A total of 251 subjects attending infertility clinic were included in the study. 86 cases with EB in luteal phase of previous stimulation cycle were included in Group A, 90 cases with EB in proliferative phase of same stimulation cycle were included in Group B and 75 cases with no EB in previous 3 months were taken in control Group C. Overall the clinical pregnancy (CPR) was significantly higher 31.1% in Group B as compared to 19.7% in Group A and 9.3% in Group C with (P = 0.003). The results of the present study indicate a beneficial effect of inducing LEI preceding COS with IUI cycles in the intervention group as compared to control Group especially in first cycle of IUI after EB in the follicular phase.

In our study endometrial thickness obtained on day of HCG, trigger was significantly high in Group B with mean ET 8.4 ± 1.84 (P = 0.002). The good endometrium development after scratching in the same phase may be due to increase angiogenesis and inflammatory mechanism which in turn may be one of the contributing factor for increase CPR in Group B.

In the luteal phase, the mean day for taking EB in Group A was 21.7 ± 1.46. Pregnancy was maximum in cases with EB done on D22 (38.9%) of cycle but it was not statistically significant (P = 0.460). In the follicular phase, the mean day for taking EB in Group B was 2.14 ± 0.68. Pregnancy rate was significantly more (32.1%) when EB was done on D2 with P = 0.001.

It is unknown whether pregnancy rate are better with scratching of endometrium in the preceding luteal phase or same stimulation cycle. In our study, EB was done in the luteal phase of cycle in Group A. CPR was found to be increased in intervention Group A (19.7%) as compared to the nonintervention Group C (9.3%). Worldwide the literature reports pregnancy rate of 9–13% in IUI cycle. Our success rate in intervention Group A was 19.7%, which is high as compared to the reported literature. Various similar studies in IVF with EB done in the luteal phase in preceding cycle have also reported higher pregnancy rates [Table A].

In our study in Group B, EB was done in early follicular phase of same cycle of stimulation. Higher CPR (31.1%)

Table 2: Effect of endometrial thickness on day of hCG trigger on pregnancy outcome after EB

ET	Pregnancy (%)			*P*
	Intervention group		Control group	
	Group A (luteal phase EB)	Group B (follicular phase EB)	Group C	
<7 mm	2/31 (6.5)	2/16 (12.1)	4/38 (10.5)	0.288
7-9 mm	9/32 (28.1)	7/34 (20.6)	2/22 (9.1)	0.265
9-11 mm	2/9 (22.2)	5/18 (27.8)	1/10 (10)	0.713
>11 mm	1/3 (33.3)	2/7 (28.6)	0/5 (0)	0.542
Total	14/75	16/75	7/75	0.1145

hCG=Human chorionic gonadotropin; EB=Endometrial biopsy; ET=Endometrial thickness

Table 3: Effect of cycles of IUI on pregnancy outcome after EB

	Intervention group				*P*
	Luteal phase EB		Follicular phase EB		
	Group A	Pregnancy (%)	Group B	Pregnancy (%)	
I cycle	58	13 (22.5)	17	13 (76.5)	<0.001
II cycle	16	1 (6.3)	36	3 (8.3)	
III cycle	1	0	21	0	
Total	75	14	75	16	

EB=Endometrial biopsy; IUI=Intrauterine insemination

Table 4: Effect of EB on pregnancy outcome

	Group	Frequency (%)	CPR (%)	OHSS (%)	Multiple pregnancy (%)	Abortion (%)
Intervention	Group A	86 (34.26)	17 (19.77)	1 (1.2)	Nil (0)	2 (2.3)
	Group B	90 (35.86)	28 (31.11)	2 (2.2)	One twin (1.1)	4 (4.4)
Control	Group C	75 (29.88)	7 (9.33)	0 (0)	Nil (0)	0 (0)
Total		251 (100)	52 (20.71)	3	1	6
P			0.0026	0.425	0.407	0.177

EB=Endometrial biopsy; CPR=Clinical pregnancy rate; OHSS=Ovarian hyperstimulation syndrome

Consort flow diagram

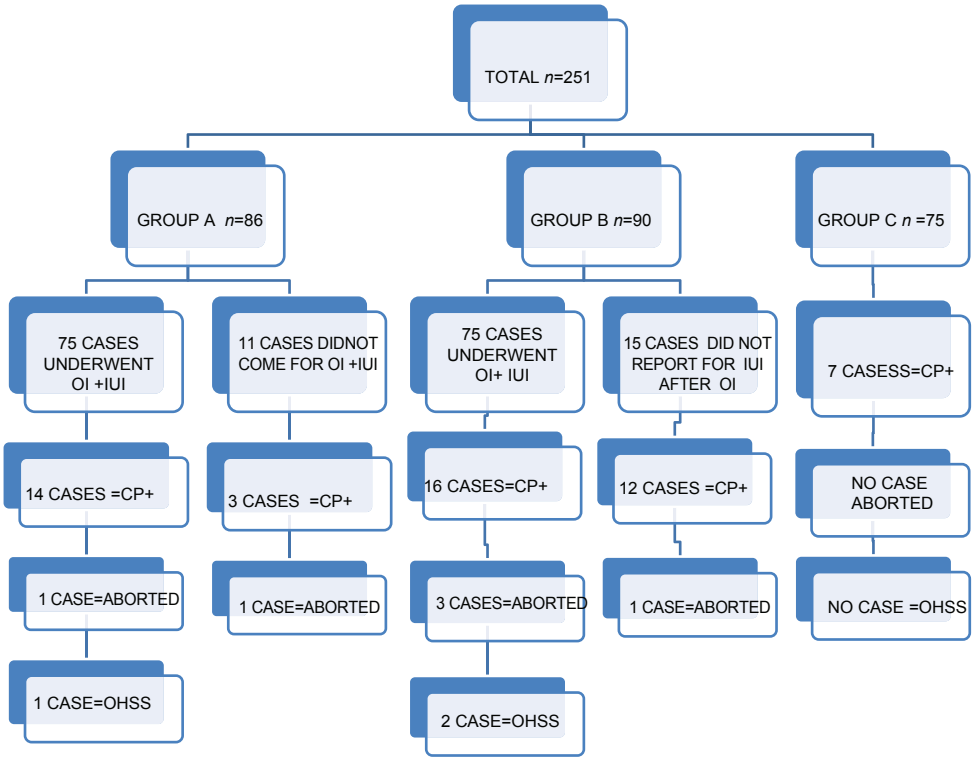

Table A: Comparing effect of EB in the luteal phase on clinical pregnancy rate in IVF

Studies (EB scratch)	Design	Participants	Timing of intervention	Method of intervention	CPR/RR/*P*	ITT analysis
Barash *et al.*[4]	NR	Pre 1 failed *n*=134 intervention=45	8, 12.21, 26 (4 times) preceding cycle	Pipelle	66.7% versus 30.3% 2.20 0.00009	Yes
Raziel *et al.*[6]	NR	Prefailed *n*=120 intervention pt=60	D21 and D26 2 times in preceding cycle	Pipelle	30% versus 12% (2.44) 0.02	Yes
Karimzadeh *et al.*[8]	RCT	2-6 prefailed, *n*=115 intervention=58	Luteal phase of preceding cycle (21-26)	Pipelle	27.9% versus 8.9% 3.05 0.02	No
Tiboni *et al.*[20]	Prospective, no control	(Prev. failed)	Day 21 of preceding cycle	NA	45.94%	No
Zepnep *et al.*[21]	RCT	(Pre 1 failed) *n*=100 intervention=50	Luteal phase 2 times with 1-week interval	Pipelle	60% versus 34% 0.009	No
Present study in IUI, (2014)	RCT	Group A=81 nonintervention *n*=75	Group A=(luteal) D19-24D	Endocell	19.7% versus 9.3% 2.11 0.077	Yes

EB=Endometrial biopsy; IUI=Intrauterine insemination; IVF=*In vitro* fertilization; RCT=Randomized controlled trial; CPR=Clinical pregnancy rate; ITT=Intention-to-treat; RR=Relative risk; NA=Not available

were obtained which are comparable to those in IVF cycles. The CPR has been reported to be significantly increased in IVF cycles with EB in follicular phases of same or preceding cycle [Table B].

In our study, CPR was maximum after first cycle of OI and IUI following EB scratch in both Groups A (22.5%) and Group B (76.5%). It was significant with $P < 0.001$. EB have been tried in first IVF cycle in various studies with variable pregnancy rate [Table C]. Our results are consistent with these studies that CPRs are significantly increased subsequent to endometrial injury.

In our study, EB was taken in OPD, and no analgesics were used. There were no complain of severe pain and discomfort after EB in intervention Group.

From the present study, it was concluded that overall CPR was significantly higher in intervention Groups as compared to control Group. Pregnancy outcome in intervention

Table B: Comparing effect of EB in the follicular phase on clinical pregnancy rate in IVF

Studies (EB scratch)	Design	Participants	Timing of intervention	Method of intervention	CPR/RR/P	ITT analysis
Barash *et al.*[4]	NR	Pre 1 failed *n*=134 intervention=45	8, 12.21, 26 (4 times) preceding cycle	Pipelle	66.7% versus 30.3% 2.20 0.0009	Yes
Zhou *et al.*[7]	RCT	First *n*=121 intervention=61	Day 10 preceding cycle	Endometrial biopsy catheter	48.3% versus 27.8% 1.73 significant	Yes
Karimzade *et al.*[10]	RCT	First, *n*=156 intervention pt *n*=77	Day of oocyte retrieval	Novak	12.3% versus 32.9% <0.05	No
Li *et al.*[11]	Retrospective analysis	First *n*=71 intervention=35	Once 2-3 weeks prior to ET, same cycle	Endometrial biopsy catheter	RR=4.37 CI=1.63-11.70	Yes
Bonavita *et al.*[14]	NR	First, *n*=147 intervention=49	Between 5 and 26 D of preceding cycle	Pipelle	RR=1.44 CI=1.06-1.96 significant	Yes
Guven *et al.*[15]	NR	First *n*=118 intervention=56	2-3 weeks prior ET in same cycle	Endometrial biopsy catheter	RR=1.66 CI=1.03-2.67 significant	Yes
Nastri *et al.*[22]	RCT	(Prefailed) *n*=158 intervention=79	7-14 before staring COS	Pipelle	49.4% versus 29.1% 0.01	Yes
Present study in IUI (2014)	RCT	Group B=90 Group C=75	Group B = (follicular phase EB) 2D-6D	Endocell	31.1% versus 9.3% 3.33 0.0009	Yes

EB=Endometrial biopsy; IUI=Intrauterine insemination; IVF=*In vitro* fertilization; RCT=Randomized controlled trial; CI=Confidence interval; CPR=Clinical pregnancy rate; RR=Relative risk; COS=Controlled ovarian stimulation

Table C: Comparing effect of LEI on clinical pregnancy in first IVF cycle

Studies (hysteroscopy)	Design	Participants	Timing of intervention	Method of intervention	CPR
Zhou *et al.*[7]	RCT	First *n*=121 intervention=61	Day 10 preceding cycle	Endometrial biopsy catheter	48.3% versus 27.8% 1.73 significant
Karimzade *et al.*[10]	RCT	First, *n*=156 Intervention pt *n*=77	Day of oocyte retrieval	Novak	12.3% versus 32.9% <0.05
Li *et al.*[11]	Retrospective analysis	First *n*=71 intervention=35	Once 2-3 week prior to ET, same cycle	Endometrial biopsy catheter	RR=4.37 significant
Mooney and Milky[12]	NR	*n*=94 intervention=48	Follicular phase in preceding cycle	5 mm with saline distension	71% versus 39% significant
Doldi *et al.*[13]	NR	*n*=600 intervention=300	Early follicular phase in same cycle	9 mm monopolar OH with 3% mannitol distension	38% versus 18% 0.02
Bonavita *et al.*[14]	NR	First, *n*=147 intervention=49	Between 5 and 26 D of preceding cycle	Pipelle	RR=1.44 significant
Guven *et al.*[15]	NR	First, *n*=118 intervention=56	2-3 weeks prior ET in same cycle	Endometrial biopsy catheter	RR=1.66 significant
El-Nashar and Nasr[23]	RCT	*n*=124 intervention=62	NA	NA	40.3% versus 24.3% 0.06
Trninic-Pjevic *et al.*[24]	NR	*n*=480 intervention=193	Follicular phase in same cycle	Hysteroscopic biopsy-induced injury	43.5% versus 36.9% <0.05
Karayalçin *et al.*[25]	NR	*n*=978 intervention=407	Within 50 days of IVF cycle	Rigid 4 mm hysteroscope, 2% glycine media	45.2% versus 27.1% <0.05
Yu *et al.*[26]	NR	*n*=499 intervention=215	Early follicular phase	3.1 mm flexible hysteroscope, 5% dextrose	CPR 43% versus 44% LBR=51.2% versus 33.6% 0.02
Kilic *et al.*[27]	NR	*n*=498 intervention=100	Follicular phase 5-7 days	4 mm scope with normal saline	26.1% versus 18.3% <0.05

Contd...

Table C: Contd..

Studies (hysteroscopy)	Design	Participants	Timing of intervention	Method of intervention	CPR
Present study in IUI 2014 (subgroup analysis)	RCT	Group A=58 Group B=17 Group C=41	Group A=luteal D19-24D Group B=follicular D2-D6	Endocell	Group A=22.5% Group B=76.5% Group C=4.8% <0.001

EB=Endometrial biopsy; IUI=Intrauterine insemination; IVF=*In vitro* fertilization; RCT=Randomized controlled trial; CI=Confidence interval; CPR=Clinical pregnancy rate; RR=Relative risk; NA=Not available; LEI=Local endometrial injury

Group B with EB done in early follicular phase in same cycle of stimulation was significantly higher than control Group and it was also higher as compared to cases with EB done in luteal phase of preceding cycle in Group A but was not statistically significant. The risk of OHSS, multiple pregnancy, and abortion was not statistically significant in all three Groups. CPR was maximum after first cycle of OI and IUI following EB scratch in both Groups A and in Group B, and it was statistically significant.

Most of the work related to endometrial scratching has been done in IVF cycles with promising results. Very few studies[28,29] have evaluated the effect of endometrial sampling done in previous or same cycle of stimulation on IUI outcome with either no effect or improvement in pregnancy rates. Further studies with large sample size are required to know if the intervention in form of endometrial scratching will be beneficial in a particular subgroup of cases, maybe in our study most of the cases that benefitted from the intervention were of unexplained infertility group (41.9% in Group A, 53.3% in Group B, 46.7% in Group C). Severe endometriosis cases were directly referred for IVF and PCOS cases were included in ovulatory dysfunction None of the studies in IVF/IUI have mentioned effect of stimulation protocol and duration of infertility on CPR after EB in detail.

In developing countries like India with increasing infertility rates there is requirement of affordable, low cost interventions like endometrial scratching which can be done as an OPD procedure prior to OI and IUI cycles, thereby improving pregnancy rates before proceeding for high cost alternative ART procedures.

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Conflicts of interest
There are no conflicts of interest.

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