Original Article

Role of Intrauterine Platelet Rich Plasma in Inducing High Pregnancy Rates in Women with Unexplained Infertility Undergoing Intra Uterine Insemination/ In Vitro Fertilisation with Ovarian Stimulation

Kshama Gandhi[1], Poonam Singh[2], Rajul Rastogi[3], Seema Awasthi[4]

[1]JR3, Department of Obstetrics and Gynaecology, Teethanker Mahaveer University, Moradabad, Uttar Pradesh, India. [2]Head of IVF, Department of Obstetrics and Gynaecology, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India. [3]Associate Professor, Department of Radiology, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India. [4]Head, Pathology of Department, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India.

Abstract

Background: Despite advances in assisted reproductive technologies (ART), implantation and pregnancy rates remain suboptimal in women with unexplained infertility, largely due to impaired endometrial receptivity. Intrauterine platelet-rich plasma (PRP), rich in growth factors, has emerged as a potential adjunct therapy to enhance endometrial thickness and improve implantation outcomes in patients undergoing intrauterine insemination (IUI) or in vitro fertilisation (IVF). **Material and Methods:** This non-randomised controlled trial was conducted at Teerthanker Mahaveer Medical College and Research Centre, Moradabad, over a period of 18 months. A total of 66 women with unexplained infertility undergoing their first cycle of IUI or IVF with ovarian stimulation were included. The intervention group received intrauterine infusion of autologous PRP, while the control group underwent standard IUI/IVF treatment without PRP. Endometrial thickness was assessed before and 48–72 hours after PRP administration using transvaginal sonography. Pregnancy outcomes were evaluated using urine pregnancy test, serum beta-hCG levels, and detection of fetal heart sounds. Statistical analysis was performed using SPSS version 24, with $p \leq 0.05$ considered statistically significant. **Results:** The mean endometrial thickness increased significantly from 1.18 ± 0.28 mm before PRP to 4.03 ± 1.14 mm after PRP administration ($p < 0.001$). Positive urine pregnancy test results were observed in 84.8% of patients in the PRP group compared to 27.3% in the non-PRP group ($p < 0.001$). Mean serum beta-hCG levels were significantly higher in the PRP group (33.04 ± 5.01) than in the control group (11.70 ± 2.19; $p = 0.001$). The presence of fetal heart sounds was also significantly higher in the PRP group (84.8%) compared to controls (27.3%). **Conclusion:** Intrauterine platelet-rich plasma significantly improves endometrial thickness and pregnancy outcomes in women with unexplained infertility undergoing IUI or IVF with ovarian stimulation. PRP appears to be a safe and effective adjunctive therapy for enhancing endometrial receptivity and increasing clinical pregnancy rates. Further large-scale randomised controlled trials are recommended to standardise PRP protocols and confirm long-term efficacy.

Keywords: Unexplained Infertility, Endometrial thickness, PRP, IUI, IVF, transvaginal sonography.

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Introduction

Successful embryo implantation requires the coordinated interaction of a viable embryo, a receptive endometrium, effective embryo–endometrial communication, and balanced maternal immune modulation.[1] Despite significant advances in Assisted Reproductive Technologies (ART), implantation rates remain suboptimal. Endometrial receptivity plays a critical role and is governed by a complex network of molecular and cellular regulators, including cytokines and transcription factors.[2]

Intrauterine insemination (IUI) serves as a cost-effective and minimally invasive fertility treatment, often preceding more advanced interventions such as in vitro fertilization (IVF). Letrozole, a selective aromatase inhibitor, is commonly used for ovulation induction due to its endometrial-sparing properties.[3] Recently, intrauterine infusion of platelet-rich plasma (PRP)—an autologous blood product enriched with growth factors and adhesion molecules—has emerged as a promising approach for improving endometrial thickness and implantation outcomes.[4]

Epidermal growth factor (EGF), one of the key growth factors

Address for correspondence: Dr. Kshama Gandhi, JR3, Department of Obstetrics and Gynaecology, Teethanker Mahaveer University, Moradabad, Uttar Pradesh, India.
E-mail: kshamaobg.0897@gmail.com

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present in PRP, plays a vital role in endometrial proliferation, differentiation, and embryo–uterine interaction during implantation.[5] This study explores the effect of intrauterine PRP administration on pregnancy outcomes among women with unexplained infertility undergoing IUI or IVF with ovarian stimulation.

AIM

To assess the effectiveness of Intrauterine PRP in patients wth unexplained infertility undergoing IUI/IVF with ovarian stimulation.

Objectives

1. To assess the effectiveness of intrauterine PRP on enhancement of endometrial receptivity and increase in endometrial thickness.
2. To assess the number of positive pregnancy outcomes in females receiving intrauterine PRP prior to IUI/IVF as compared to females receiving only IUI/IVF treatment.

Materials and Methods

The study was undertaken at TMMC and RC, Moradabad as a non-randomized control trial for 18 months. Sample size was 66 calculated based on a study by Lin Y et al.

Inclusion criteria

1. Women aged between 25 to 45 years.
2. First cycle of IUI/IVF.
3. Expected good responders to treatment (i.e., females with ovulatory menstrual cycle).
4. Patients with thin endometrium (Assessed by transvaginal sonography), chronic endometritis, Asherman syndrome.
5. Expected good ovarian reserve (assessed clinically, biochemically; FSH<10, normal follicular phase estradiol levels, AMH, AFC, no previous history of radiotherapy or chemotherapy.
6. Understands and willingly complies to the protocol.

Exclusion Criteria

1. BMI of 35 kg/m2 or greater.
2. Adenomyosis
3. Currently participating in any other fertility study involving medical/ surgical intervention.
4. Another endometrial procedure is planned.
5. Local vaginal/uterine infection.

Method

Step 1: Informed consent: Informed consent regarding the procedure was taken.

Step 2: Platelet Rich Plasma will be prepared as follows:

First Centrifugation: 1100 rpm for 11 minutes. Platelet-rich plasma is separated and remains on top. Plasma is transferred to another glass tube by sterile pipette. Second Centrifugation: 3300 rpm for 7 minutes to get platelet pellet from separated plasma.

Infusion: 0.5-1 ml platelet-rich plasma via catheter.

Step 3: Endometrium Assessment is done on Day 5 of menstrual cycle and reassessment is done 48-72 hours post intrauterine PRP infusion. 33 patients will receive intrauterine PRP who have given informed consent.

Step 4: In Vitro Fertilization/Intra Uterine Insemination done.

Step 5: Outcomes measured by Positive Pregnancy Rate: positive UPT, positive beta hCG in 8-11 days, presence of fetal heart sound at 5-6 weeks. Increase in endometrial thickness as assessed by transvaginal sonography was the primary outcome measure.

Step 6: If pregnant, follow-up was done.

Statistical Analysis: The data were tabulated in Microsoft excel and analysed with SPSS V.24 software. The continuous variables are presented with mean and standard deviation. The categorical variables are presented with frequency and percentage. Independent t test, paired t test and chi square test are used for statistical analysis. The p value ≤0.05 was considered statistically significant.

Results

Table 1: Comparison of ET between individuals before and after receiving PRP.

Parameter	Time	Mean	SD	P value
ET in PRP group	Before PRP	1.18	0.28	<0.001
	After PRP	4.03	1.14	

Before PRP treatment, the mean ET was 1.18 (SD 0.28), whereas after PRP treatment, it significantly increased to 4.03 (SD 1.14). The difference was statistically significant with a p-value of less than 0.001, indicating a substantial change in ET following PRP treatment.

Table 2: Comparison of Urine Pregnancy Test results between two groups after receiving IVF/IUI

Parameter		With PRP	Without PRP	Total	P value
UPT	Positive				<0.001
	N	28	9	37	
	%	84.8%	27.3%	56.1%	
	Negative				
	N	5	24	29	
	%	15.2%	72.7%	43.9%	
Total	N	33	33	66	
	%	100.0%	100.0%	100.0%	

There was a significant difference in UPT results between individuals with and without PRP treatment, with 84.8% of individuals in the PRP group testing positive compared to only 27.3% in the group without PRP treatment, with $p < 0.001$.

Table 3: Comparison of beta hcg results between two groups

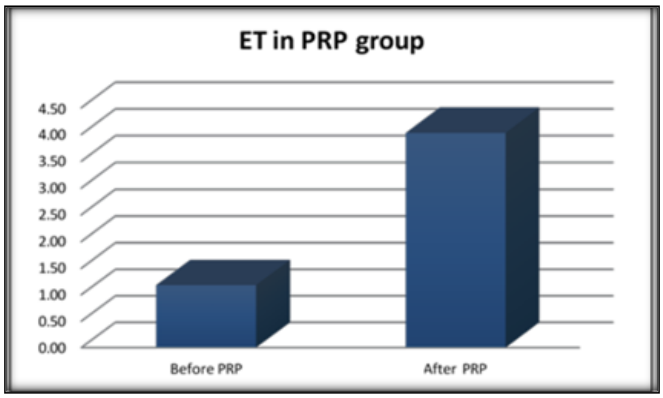
Parameter	Group	Mean	SD	P value
Beta Hcg	With PRP	33.04	5.01	
	Without PRP	11.70	2.19	<0.001

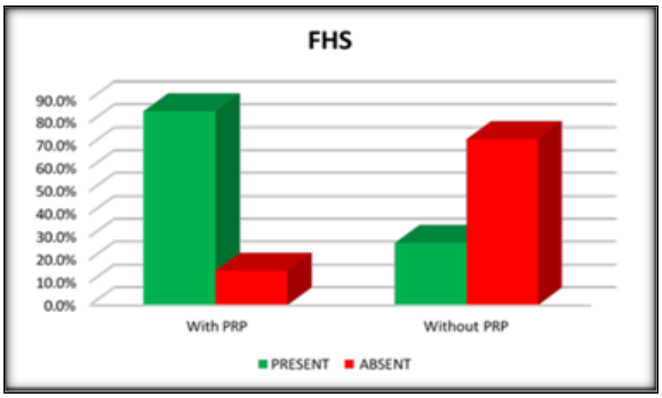
Individuals receiving PRP treatment exhibited higher mean Beta Human Chorionic Gonadotropin (Beta Hcg) level of 33.04 (SD 5.01), compared to those without PRP treatment, who had a mean of 11.70 (SD 2.19). The difference was statistically significant with a p-value of <0.001.

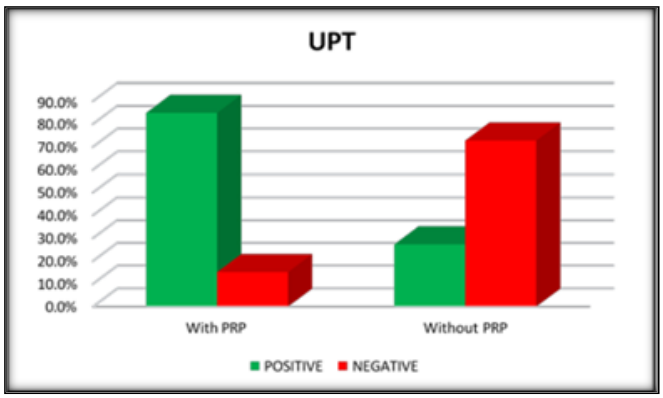
Table 4: Comparison of presence of Fetal Heart Sound between two groups

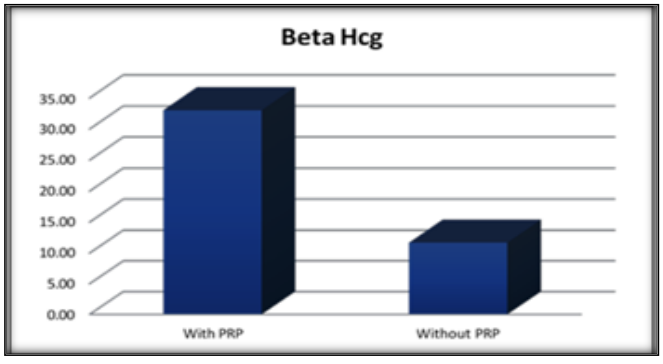
Parameter		With PRP	Without PRP	Total	P value
FHS	Present				
	N	28	9	37	
	%	84.8%	27.3%	56.1%	
	Absent				
	N	5	24	29	<0.001
	%	15.2%	72.7%	43.9%	
Total	N	33	33	66	
	%	100.0%	100.0%	100.0%	

The distribution of FHS was significantly different between individuals with and without PRP treatment, with 84.8% of individuals in the PRP group having FHS present compared to only 27.3% in the group without PRP treatment, with $p < 0.001$.









Discussion

Intrauterine platelet-rich plasma (PRP) appears to be a promising adjunct to assisted reproductive technologies by targeting one of the key limiting factors of treatment success: endometrial receptivity. PRP, prepared from autologous blood, delivers a high concentration of growth factors and cytokines that can stimulate angiogenesis, enhance tissue regeneration, modulate inflammation, and remodel the extracellular matrix, thereby improving the uterine environment for embryo implantation.

In this study, women with unexplained infertility undergoing IUI or IVF with ovarian stimulation who received intrauterine PRP showed baseline demographic comparability with controls, as age, weight, height, and BMI did not differ significantly between groups. PRP administration was associated with a marked increase in endometrial thickness, with post-treatment values significantly higher than pre-treatment measurements, consistent with previous reports showing PRP-induced endometrial expansion. Furthermore, a substantially higher proportion of patients in the PRP group demonstrated favorable endometrial sonographic features and achieved clinical pregnancy compared with the non-PRP group, aligning with prior studies that reported improved implantation and pregnancy rates following intrauterine PRP.

Overall, these findings support intrauterine PRP as a safe and potentially effective strategy to enhance endometrial receptivity

and pregnancy outcomes in women with unexplained infertility. PRP may therefore represent a valuable adjunct to conventional ovulation induction and insemination/IVF protocols, although larger, well-designed multicenter trials are required to standardize protocols, define optimal candidates, and confirm long-term efficacy and safety.

Conclusion

The study on the role of intrauterine platelet-rich plasma (PRP) in inducing high pregnancy rates in women with unexplained infertility undergoing intrauterine insemination (IUI) or in vitro fertilisation (IVF) with ovarian stimulation provides compelling evidence supporting the efficacy of PRP as an adjunctive treatment.

The findings demonstrate that PRP administration leads to improved endometrial thickness, higher implantation rates, and increased clinical pregnancy rates in women with infertility with no known cause. These results suggest that PRP can effectively address underlying endometrial deficiencies that often remain undetected in standard infertility evaluations.

However, the necessity for standardized PRP preparation and administration protocols, along with long-term safety assessments remain paramount. Future large-scale, multicenter randomized controlled trials are essential to validate these findings and establish PRP as a mainstream intervention in fertility treatments.

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Conflicts of interest

There are no conflicts of interest.

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