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Original Research Article

Determinants of postpartum intrauterine contraceptive device use: a case-control study at a tertiary care center in India

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ABSTRACT

Background: Postpartum intrauterine contraceptive devices (PPIUCD) offer safe, effective, long-term contraception during the immediate postpartum period. Despite its advantages, acceptance remains low in India. Understanding the determinants of PPIUCD use is crucial for improving family planning services. This study aimed to identify determinants of PPIUCD use among postnatal women at a tertiary care center and determine their strength of association.

Methods: A hospital-based case-control study was conducted from March 2023 to February 2025. Cases included 70 postnatal women using PPIUCD, and controls included 70 age-matched postnatal women not using PPIUCD. Data were collected using predesigned questionnaires covering sociodemographic characteristics, reproductive history, and obstetric factors. Univariate and multivariate logistic regression analyses were performed.

Results: The mean age was 24.57±3.87 years among cases and 23.85±3.70 years among controls. Significant determinants in univariate analysis included education level, husband's education and occupation, age at marriage, fertility preference, planned pregnancy, PPIUCD counseling, gravidity, and parity. In multivariate analysis, joint decision-making on family size (OR: 0.043, 95% CI: 0.007-0.275), planned pregnancy (OR: 2.674, 95% CI: 1.022-6.995), PPIUCD counseling (OR: 12.674, 95% CI: 4.668-34.411), and multiparity (OR: 0.147, 95% CI: 0.055-0.393) remained significant determinants.

Conclusions: PPIUCD counseling emerged as the strongest predictor of acceptance. Comprehensive antenatal counseling involving both partners, promoting planned pregnancies, and addressing cultural barriers through community education are essential for improving PPIUCD uptake.

Keywords: Counseling, Family planning, India, Intrauterine contraceptive device, Postpartum contraception

INTRODUCTION

India, the world's most populous country, faces significant challenges in population management and maternal health.[1] The postpartum period represents a critical opportunity for contraceptive initiation, as women are highly motivated and healthcare providers have direct access to them during institutional deliveries.[2] Postpartum intrauterine contraceptive devices (PPIUCD) offer an ideal solution by providing safe, effective, long-acting, and reversible contraception immediately after childbirth.[3]

Globally, about one of the five women in reproductive age group use IUCD.[4] PPIUCD acceptance remains suboptimal in India. The current use of intrauterine device or postpartum intrauterine contraceptive device in India is 2.1% according to NFHS-5.[5] The current use in urban and rural area in India is 2.7% and 1.8% respectively.[7] According to NFHS-5 current use of ppiucd in Maharashtra is 1.9%.[6] The current use in urban and rural

area in Maharashtra is 2.2% and 1.6% respectively which is below the level of usage in India.[6]

The Government of India launched the PPIUCD program in 2010 to address the unmet need for family planning during the postpartum period. However, various sociodemographic, cultural, and health system factors influence women's decisions to accept or reject PPIUCD. Understanding these determinants is crucial for developing targeted interventions to improve acceptance rates and reduce the burden of unintended pregnancies.[7-9]

Previous studies have identified education, counseling, parity, and partner support as key factors influencing PPIUCD acceptance.[10] However, limited research has been conducted in tertiary care settings in India using robust case-control methodology.

This study aimed to identify the determinants of PPIUCD use among postnatal women at a tertiary care center and quantify their associations to inform evidence-based policy recommendations.

METHODS

Study design and setting

A hospital-based case-control study was conducted at the obstetric wards of a tertiary care center in Maharashtra from March 2023 to February 2025. The study was approved by the Institutional Ethics Committee.

Study population

Cases: Postnatal women who had PPIUCD inserted within 48 hours of delivery.

Controls: Postnatal women who did not use PPIUCD, matched for age (±2 years).

Sample size

The sample size was calculated using OpenEpi software based on an anticipated probability of exposure (fertility preference) of 70.3% in controls, an odds ratio of 4, power of 80%, and confidence level of 95%. The calculated sample size was 140 participants (70 cases and 70 controls).

Inclusion criteria

Postnatal women admitted in obstetric wards, age-matched controls (±2 years), willing to provide informed consent were included.

Exclusion criteria

Severely ill patients, women who underwent permanent sterilization, and refusal to participate were excluded.

Data collection

A predesigned, prestructured questionnaire was used to collect information on: 1) Sociodemographic characteristics (age, residence, religion, education, occupation, family type, socioeconomic status), 2) Reproductive history (marriage duration, age at marriage, fertility preferences, contraceptive history), 3) Obstetric factors (gravidity, parity, antenatal visits, mode of delivery), 4) PPIUCD-specific factors (counseling received, timing of counseling, sources of information).

Operational definitions

PPIUCD: Intrauterine contraceptive device inserted within 48 hours of delivery.

Planned pregnancy: Pregnancy intended by the couple.

Regular menstrual cycle: Cycle of 28±2-3 days with 3-5 days of bleeding.

Socioeconomic status: Based on modified BG Prasad classification 2024.

Statistical analysis

Data were analyzed using SPSS software. Univariate analysis was performed using chi-square tests and Fisher's exact test. Variables with $p<0.05$ in univariate analysis were included in multivariate logistic regression to identify independent determinants. Results were presented as odds ratios with 95% confidence intervals.

RESULTS

Sociodemographic characteristics

The study included 140 participants (70 cases and 70 controls). The mean age was 24.57±3.87 years among cases and 23.85±3.70 years among controls. Most participants were from urban areas (57.9%), Hindu (48.6%), and belonged to class III socioeconomic status (37.9%) (Table 1).

Significant determinants in univariate analysis

Educational factors

Compared to illiterate women, those with high school education had 7.86 times higher odds of PPIUCD use (OR: 7.857, 95% CI: 1.312-47.044, p=0.024). Women with intermediate/diploma education had 10 times higher odds (OR: 10.000, 95% CI: 1.860-53.756, p=0.007).

Husband's education also significantly influenced PPIUCD acceptance. Women whose husbands had education up to high school were 13.12 times more likely to use PPIUCD compared to those with illiterate husbands (OR: 13.12, 95% CI: 1.36-126.30, p=0.026).

Reproductive factors

Women married at age ≤18 years had 2.54 times higher odds of PPIUCD use (OR: 2.536, 95% CI: 1.284-5.009, p=0.007). Multigravid women (≥2 pregnancies) were 7.58 times more likely to accept PPIUCD (OR: 7.583, 95% CI: 3.406-16.88, p<0.001). Similarly, multiparous women had 6.37 times higher odds (OR: 6.37, 95% CI: 2.985-13.59, p<0.001).

Table 1: Distribution of study participants according to sociodemographic characteristics.

Variable		PPIUCD user	PPIUCD non user	Total	P value	Odds ratio (95% CI)
Age (years)	18-23	31 (44.3)	37 (52.9)	68 (48.6)	1	1
	24-29	29 (41.4)	27 (38.6)	56 (40.0)	0.490	0.621 (0.161,2.402)
	30-35	10 (14.3)	6 (8.6)	16 (11.4)	0.724	0.776 (0.189,3.174)
Residence	Urban	42 (60.0)	39 (55.7)	81 (57.9)	0.492	1.339 (0.582,3.077)
	Rural	28 (40.0)	31 (44.3)	59 (42.1)		
Education of participant	Illiterate	6 (8.6)	3 (4.3)	9 (6.4)	1	1
	Middle school	16 (22.9)	10 (14.3)	26 (18.6)	0.153	5.000 (0.551, 45.391)
	High school	31 (44.3)	23 (32.9)	54 (38.6)	0.024*	7.857 (1.312, 47.044)
	Intermediate/ diploma	14 (20.0)	18 (25.7)	32 (22.9)	0.007*	10.000 (1.860, 53.756)
	Graduate and profession	3 (4.3)	16 (22.9)	19 (13.6)	0.034*	6.500 (1.155, 36.575)
Education of husband	Illiterate	8 (11.4)	4 (5.7)	12 (8.6)	1	1
	Up to high school	35 (50.0)	25 (35.7)	60 (42.9)	0.026*	13.12 (1.36,126.30)
	Intermediate/ diploma	18 (25.7)	20 (28.6)	38 (27.1)	0.019*	3.75 (1.245,11.299)
	Graduate and above	9 (12.9)	21 (30.0)	30 (21.4)	0.355	1.73 (0.541,5.536)
Total		70 (100.0)	70 (100.0)	140 (100.0)	-	-

(*denotes statistically significant p value <0.05)

Table 2: Distribution of study participants according to obstetric characteristics.

Variable		PPIUCD user	PPIUCD non user	Total	P value	Odds ratio (95% CI)
Age at marriage (years)	≤ 18	43 (61.4)	27 (38.6)	70 (50.0)	0.007*	2.536 (1.284, 5.009)
	>18	27 (38.6)	43 (61.4)	70 (50.0)		
Fertility preference	No more child	53 (75.7)	29 (41.4)	82 (58.6)	0.003*	3.735 (1.547, 9.018)
	Want child	17 (24.3)	41 (58.6)	58 (41.4)		
Number of live children	1	18 (25.7)	45 (64.3)	63 (45.0)	1	1
	2	25 (35.7)	10 (14.3)	35 (25.0)	0.076*	0.286 (0.071, 1.142)
	3	17 (24.3)	10 (14.3)	27 (19.3)	0.617	1.469 (0.326, 6.632)
	4 and more	10 (11.4)	4 (5.7)	14 (8.6)	0.212	3.429 (0.494, 23.775)
Decision on no. of children want to have	Husband	25 (35.7)	25 (35.7)	50 (35.7)	1	1
	Wife	2 (2.9)	10 (14.3)	12 (8.6)	0.571	0.814 (0.400, 1.658)
	Both	43 (61.4)	35 (50.0)	78 (55.7)	0.025*	0.163 (0.033, 0.792)
Planned pregnancy	Yes	39 (55.7)	27 (38.6)	66 (47.1)	0.043*	2.004 (1.021, 3.930)
	No	31 (44.3)	43 (61.4)	74 (52.9)		
Gravida	1	11 (15.7)	41 (58.6)	52 (37.1)	<0.001*	7.583 (3.406, 16.88)
	2 and more	59 (84.3)	29 (41.4)	88 (62.9)		
Parity	1	14 (20.0)	43 (61.4)	57 (40.7)	<0.001*	6.37 (2.985, 13.59)
	2 and more	56 (80.0)	27 (38.6)	83 (59.3)		
Total		70 (100.0)	70 (100.0)	140 (100.0)	-	-

(*denotes statistically significant p value <0.05)

Fertility preferences and planning

Women who desired no more children were 3.74 times more likely to use PPIUCD (OR: 3.735, 95% CI: 1.547-9.018, p=0.003). Those with planned pregnancies had twice the odds of PPIUCD acceptance (OR: 2.004, 95% CI: 1.021-3.930, p=0.043) (Table 2).

Counselling

PPIUCD counselling showed the strongest association, with counselled women having 8.56 times higher odds of acceptance (OR: 8.556, 95% CI: 3.976-18.410, p<0.001). Counselling during early labor had the highest impact (OR: 35.357, 95% CI: 7.719-161.947, p<0.001) (Table 3).

Table 3: Distribution of study participants according to PPIUCD related factors.

Variable		PPIUCD user	PPIUCD non user	Total	P value	Odds ratio (95% CI)
PPIUCD counselling	Yes	49 (70.0)	15 (21.4)	76 (54.3)	<0.001*	8.556 (3.976, 18.410)
	No	21 (30.0)	55 (78.6)	64 (45.7)		
Time of counselling	No counselling	21 (30.0)	55 (78.6)	76 (54.3)	1	1
	During ANC follow up	7 (10.0)	3 (4.3)	10 (7.1)	0.014*	6.111 (1.444, 25.869)
	During early labor	27 (38.6)	2 (2.9)	29 (20.7)	<0.001*	35.357 (7.719, 161.947)
	After delivery	15 (21.4)	10 (14.3)	25 (17.9)	0.005*	3.929 (1.527.10.107)
Time of insertion of PPIUCD	Within 10 min of delivery	45 (64.3)	46 (65.7)	91 (65.0)	1	1
	Within 48 hrs of delivery	6 (8.6)	4 (5.7)	10 (7.1)	0.836	1.100 (0.446, 2.714)
	Intracaeserean	19 (27.1)	20 (28.6)	39 (27.9)	0.791	1.300 (0.187, 9.021)
Total		70 (100.0)	70 (100.0)	140 (100.0)	-	-

(*denotes statistically significant p value <0.05)

Table 4: Binary logistic regression analysis for determinants of PPIUCD use.

Variable		Odds ratio	95% CI		P value
			Lower	Upper	
Decision of number of children want to have	Husband	1	1	1	1
	Wife	0.608	0.218	1.693	0.341
	Both	0.043	0.007	0.275	0.001
Planned pregnancy	Yes	2.674	1.022	6.995	0.045
	No				
PPIUCD counselling	Yes	12.674	4.668	34.411	<0.001
	No				
Parity	1	0.147	0.055	0.393	<0.001
	2 and more				

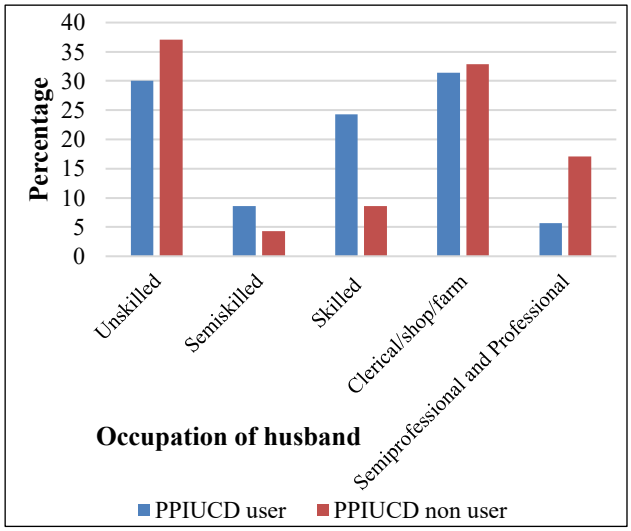

Figure 1: Distribution of study participants according to occupation of husband.

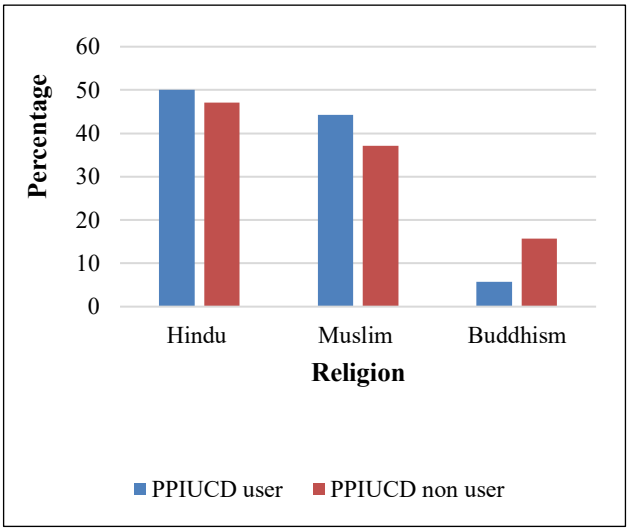

Figure 2: Distribution of study participants according to religion.

Multivariate analysis

Four factors remained significant predictors in the final multivariate model:

PPIUCD counseling: Women who received counseling were 12.67 times more likely to accept PPIUCD (OR: 12.674, 95% CI: 4.668-34.411, p<0.001).

Planned pregnancy: Women with planned pregnancies had 2.67 times higher odds (OR: 2.674, 95% CI: 1.022-6.995, p=0.045).

Joint decision-making: Couples who made joint decisions about family size were significantly more likely to use PPIUCD (OR: 0.043, 95% CI: 0.007-0.275, p=0.001).

Parity: Multiparous women were more likely to accept PPIUCD (OR: 0.147, 95% CI: 0.055-0.393, p<0.001) (Table 4).

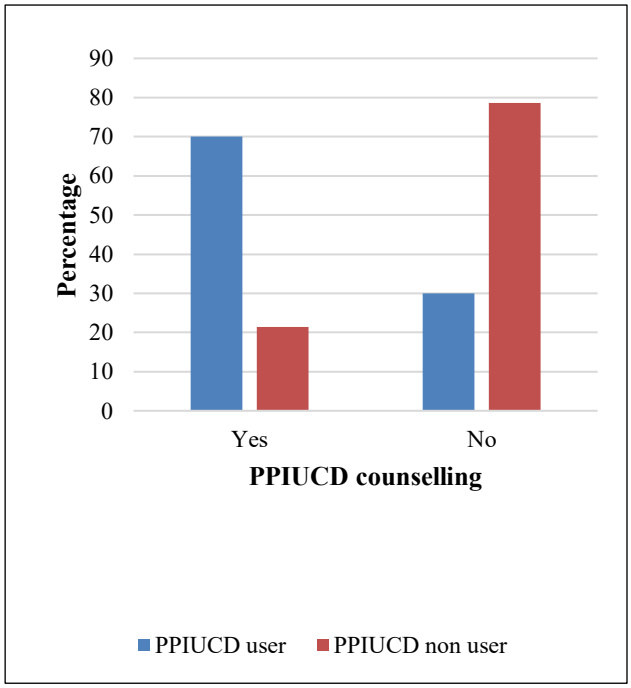

Figure 3: Distribution of study participants according to PPIUCD counselling.

Timing of PPIUCD insertion

Among PPIUCD users, 64.3% had post-placental insertion (within 10 minutes), 27.1% had intracesarean insertion, and 8.6% had insertion within 48 hours of delivery.

DISCUSSION

The postpartum period offers a critical window for promoting effective contraceptive methods, such as the postpartum intrauterine contraceptive device (PPIUCD), which is safe, reliable, and convenient. Understanding the determinants that influence the acceptance or rejection of PPIUCD is essential to improving its utilization and consequently reducing unintended pregnancies. This study identified several key determinants of PPIUCD acceptance, with counselling emerging as the strongest predictor.

Age

In the present study, 44.3% of PPIUCD users and 52.9% of non-users were aged 18-23 years, followed by 41.4% and 38.6% in the 24-29 years group, respectively. The mean age was 24.57±3.87 years among users and 23.85±3.70 years among non-users, with no significant difference. These results align with Gonie et al (26.26±4.78 years), Daba et al (24.23±3.91 years), Mohammed et al (cases: 28.13±4.66, controls: 26.87±5.05), and Pradhan et al. (cases: 27.8±2.39, controls: 25.36±3.07).[2,17,11,13]

Residence

In this study, 60.0% of users and 55.7% of non-users resided in urban areas. Difference in residence was not statistically significant. This agrees with Gonie et al (57% urban) and Jairaj et al (urban predominance: 79.75%), and Mohammed et al (more urban users).[2,19,11] Assefaw et al, however, found greater uptake among rural residents.[14]

Religion

Religious distribution showed no significant difference. Gonie et al had a predominantly Muslim population (76.2%), which may reflect geographic and cultural differences.[2]

Education of participant

In this study, education was a significant determinant: high school (OR 7.86), intermediate/diploma (OR 10.00), graduate/professional (OR 6.50) versus illiterate. Similar patterns were seen in Gonie et al, Mohammed et al, Daba et al, Kanakuze et al and Assefaw et al.[2,11,12,14]

Occupation of participant

Most women were unemployed. No significant difference in occupation between groups. Gonie et al and Nigam et al also reported high unemployment.[2,20] Several other studies found higher PPIUCD uptake among the employed.[11,12]

Education of husband

Higher husband education was significantly associated with PPIUCD use (except graduates, which was not significant). Mohammed et al and Assefaw et al observed similar or variable influence of husband education depending on region.[11,14]

Occupation of husband

Husbands in clerical, shop, or farm work were more likely to have wives accept PPIUCD (OR 12.83). Gonie et al. found 60.2% were farmers.[2]

Type of family

No significant difference in family type. Nigam et al found more nuclear families among acceptors, as did Pradhan et al.[20,13]

Socioeconomic status

No significant difference in SES in this study. Jairaj et al, Husain et al, and Kant et al found higher SES increased acceptance, but in some settings lower SES showed higher acceptance.[19,21,22]

Duration of marriage

Majority had been married 1-5 years (users: 52.9%, non-users: 67.1%). No significant difference, as also seen by Nigam et al.[20]

Age at marriage

Younger age at marriage (≤18 years) was significantly linked to PPIUCD acceptance (OR 2.54). Guye et al had later mean age at marriage and lower uptake.[15]

Fertility preference

Not wanting more children was strongly associated with PPIUCD acceptance (OR 3.74). Consistent with Assefaw et al.[14]

Number of live children

Acceptance increased with number of live children, following patterns seen in Assefaw et al and Kant et al.[14,22]

Previous use of contraception

Majority were first-time users. No significant difference. Contrasts with higher prior use rates in Gonie et al, Assefaw et al, and Guye et al.[2,14,15]

Decision on number of children

Joint decision-making increased PPIUCD use (OR 0.16 for not using). Supported by Daba et al, Guye et al and Tounkara et al.[15,17,23]

Planned pregnancy

Planned pregnancies were positively associated with uptake (OR 2.00). Similar results were observed by Mohammed et al, Guye et al.[2,11]

Source of information

About half had no prior knowledge. Most heard via relatives/antenatal clinics. Nigam et al and Ashutosh Sharma et al found health workers are the main source.[20,24]

Mode of delivery

Most women had vaginal delivery. No significant difference between groups, similar to Mohammed et al.[11]

Time of insertion

Most insertions were within 10 minutes or intracaesarean, consistent with Chauhan et al, Chethan et al.[25,26]

Gravida and parity

Multigravida/multiparous women were far more likely to use PPIUCD (OR for gravida: 7.58; parity: 6.37), aligned with Gonie et al, Mohammed et al, Assefaw et al, Kanakuze et al.[2,11,12,14]

Antenatal visits

More than four ANC visits for most, but not significant. Gonie et al, Mohammed et al, Assefaw et al, Guye et al all demonstrate ANC is a key opportunity for counselling and acceptance.[2,11,14,15]

PPIUCD counselling

Counselled women were much more likely to accept PPIUCD (OR 8.56). Strongly supported by Mohammed et al, Assefaw et al, Kanakuze et al, and Guye et al.[11,12,14,15,]

Time of counselling

Early labor counselling was most effective in this study, but other studies (Mohammed et al, Chauhan et al, Chethan et al), found antenatal counselling most effective.[11,25,26,]

Implications for public health practice

Strengthening counseling services: Implement structured, quality counseling protocols during antenatal visits and early labor, training healthcare providers in effective communication techniques.

Community education: Develop community-based education programs targeting both women and men to address misconceptions and cultural barriers.

Timing of interventions: Optimize the timing of counseling, focusing on early antenatal visits and early labor periods when women are most receptive.

Partner involvement: Design couple-centered counseling approaches that involve male partners in reproductive decision-making.

Quality improvement: Ensure availability of skilled providers and maintain infection prevention standards at all delivery points.

This study has few limitations. This study was conducted at a single tertiary care center, which may limit generalizability to other settings. The reliance on self-reported information may introduce recall and social desirability bias. Additionally, the study did not assess long-term continuation rates or reasons for discontinuation.

CONCLUSION

PPIUCD counseling emerged as the most significant determinant of acceptance, highlighting the critical role of healthcare provider communication. Planned pregnancy, joint decision-making, and multiparity were other important predictors. To improve PPIUCD uptake, health systems should prioritize comprehensive antenatal counseling, involve male partners in family planning discussions, and address cultural barriers through community education programs.

These findings provide evidence for policy makers to develop targeted interventions that can significantly improve PPIUCD acceptance rates, ultimately contributing to reduced unmet need for family planning and improved maternal health outcomes in India.

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