

A Comparative Study of Efficacy and Safety of Oral Contraceptive Pills Versus Intrauterine Devices in Preventing Unintended Pregnancy

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Abstract

Background: Unintended pregnancy remains a major public health issue globally. Oral contraceptive pills (OCPs) and intrauterine devices (IUDs) are widely used reversible contraceptive methods with different efficacy and safety profiles. **Aim:** To compare the efficacy and safety of oral contraceptive pills versus intrauterine devices in preventing unintended pregnancy. **Methods:** A prospective comparative study was conducted with 200 women, equally divided into OCP and IUD groups. Participants were followed for 12 months to assess contraceptive efficacy, adverse effects, continuation, and satisfaction rates. Data were analyzed using appropriate statistical tests with significance set at $p < 0.05$. **Results:** The unintended pregnancy rate was significantly lower in the IUD group (3%) than the OCP group (9%) ($p = 0.037$). OCP users reported higher rates of nausea, vomiting, and weight gain, while IUD users experienced more pelvic pain and device expulsions. Continuation and satisfaction rates were significantly higher with IUDs ($p < 0.05$). **Conclusion:** IUDs offer superior efficacy and higher satisfaction compared to OCPs, with differing safety profiles. IUDs should be promoted as a preferred contraceptive option for women seeking reliable, long-term contraception.

Keywords: Oral Contraceptive Pills. Intrauterine Devices. Contraceptive Efficacy and Safety.

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INTRODUCTION

Unintended pregnancy remains a significant public health challenge worldwide, with implications for maternal and child health, social dynamics, and economic development. Globally, despite the availability of numerous contraceptive methods, unintended pregnancies continue to occur, often leading to unsafe abortions, maternal morbidity, and increased health care burdens. The World Health Organization estimates that nearly 44% of pregnancies worldwide are unintended, highlighting the

critical need for effective family planning strategies to reduce these occurrences.

Oral contraceptive pills (OCPs) and intrauterine devices (IUDs) are among the most commonly used reversible contraceptive methods. Each has distinct mechanisms of action, efficacy profiles, side effects, and suitability for different populations. Understanding their comparative efficacy and safety is essential for tailoring contraceptive counseling and optimizing outcomes.^[1]

OCPs, which include combined estrogen-progestin pills and progestin-only pills, work primarily by suppressing ovulation, thickening cervical mucus to inhibit sperm penetration, and altering the endometrial lining to prevent implantation. Introduced in the 1960s, OCPs revolutionized reproductive health by providing women with control over their fertility. Their typical use failure rate is estimated around 7%, while perfect use failure rate is less than 1%. However, adherence is critical, and missed pills or inconsistent intake can markedly increase the risk of unintended pregnancy. Side effects of OCPs may include nausea, breakthrough bleeding, increased risk of

thromboembolism, and hormonal disturbances, which may influence acceptability and continuation rates.^[2]

In contrast, IUDs are long-acting reversible contraceptives (LARCs) inserted into the uterine cavity, providing contraception for 3 to 10 years depending on the type. There are two primary types: copper IUDs, which exert a spermicidal effect by releasing copper ions toxic to sperm, and hormonal IUDs that release levonorgestrel, causing endometrial thinning and cervical mucus thickening. IUDs have a typical-use failure rate of less than 1%, making them one of the most effective contraceptive options available. Their long duration, user independence, and rapid return to fertility upon removal contribute to their popularity. Side effects may include altered menstrual bleeding patterns, uterine perforation (rare), pelvic inflammatory disease (rare with modern IUDs), and expulsion.^[3]

In many developing countries, the choice between OCPs and IUDs is influenced by multiple factors, including cultural acceptance, access, education, healthcare infrastructure, and individual preferences. While both methods have demonstrated safety and efficacy, direct comparative data in specific populations remain limited.^[4] Previous studies have explored the effectiveness and safety profiles of these contraceptives. For instance, *et al.* (20)^[5] compared the continuation rates of copper IUDs with oral contraceptives, highlighting the superior adherence and efficacy of IUDs. Similarly, *et al.* (20)^[6] provided comprehensive data on contraceptive failure rates, reinforcing the high efficacy of LARCs like IUDs. Moreover, research by *et al.* (20)^[7] emphasized the safety and tolerability of both methods in diverse populations, although with varying side effect profiles.

Aim

To compare the efficacy and safety of oral contraceptive pills versus intrauterine devices in preventing unintended pregnancy.

Objectives

1. To assess and compare the contraceptive efficacy of oral contraceptive pills and intrauterine devices over a specified study period.
2. To evaluate and compare the safety profiles and adverse effects associated with oral contraceptive pills and intrauterine devices.
3. To analyze the continuation and satisfaction rates among users of oral contraceptive pills and intrauterine devices.

MATERIAL AND METHODOLOGY

Source of Data

Data was collected from women attending the Family Planning and Gynecology outpatient department who voluntarily chose either oral contraceptive pills (OCPs) or intrauterine devices (IUDs) as their contraceptive method.

Study Design

A comparative, observational, prospective study design was employed to evaluate the efficacy and safety of OCPs versus IUDs in preventing unintended pregnancy.

Study Location

The study was conducted at the Department of Obstetrics and Gynecology, at tertiary care teaching hospital.

Study Duration

The study was carried out over a period of 18 months, from January 2016 to December 2016.

Sample Size

A total of 200 women participants were enrolled in the study, with 100 women in each contraceptive method group (OCP and IUD).

Inclusion Criteria

- Women aged 18–45 years seeking contraception.
- Women opting for either oral contraceptive pills or intrauterine devices.
- Women willing to participate and provide informed consent.
- Women with no contraindications to either method according to WHO Medical Eligibility Criteria.

Exclusion Criteria

- Women with known contraindications to OCPs or IUDs (e.g., history of thromboembolic disease for OCP users, uterine anomalies for IUD users).
- Women with current pregnancy or desire to conceive within the next 6 months.
- Women with pelvic infections or untreated sexually transmitted infections.
- Women with systemic illnesses contra-indicating hormonal contraception.

Procedure and Methodology

Eligible participants were counselled about both contraceptive methods including benefits, side effects, and follow-up requirements. Those who opted for OCPs were prescribed a standard combined oral contraceptive pill containing. Women choosing IUDs underwent pelvic examination and IUD insertion performed by trained gynecologists using aseptic technique. Participants were followed up at 1 month, 3 months, 6 months, and 12 months post-initiation for evaluation of efficacy, adverse effects, and satisfaction.

Unintended pregnancy was defined as conception occurring during the study period despite use of the contraceptive method. Safety assessment included

monitoring for side effects such as bleeding irregularities, infections, device expulsions, and systemic adverse events. Compliance with OCPs was assessed by self-reporting and pill counts.

Sample Processing

Relevant clinical data were recorded in structured proformas. Pregnancy testing was conducted as indicated. Adverse events were documented in detail during follow-ups. For IUD users, ultrasound was performed in cases of suspected expulsion or abnormal bleeding.

Statistical Methods

Data were analyzed using SPSS version 27.0. Continuous variables were expressed as mean $\pm$ standard deviation and

compared using Student's t-test. Categorical variables were expressed as frequencies and percentages and analyzed using Chi-square or Fisher's exact test. The efficacy of contraceptive methods was compared using pregnancy rates and Kaplan-Meier survival analysis for continuation rates. A p-value <0.05 was considered statistically significant.

Data Collection

Data collection involved demographic details, contraceptive history, method chosen, follow-up findings, adverse effects, and pregnancy outcomes. Data were collected through face-to-face interviews, clinical examinations, and medical records during scheduled visits.

OBSERVATION AND RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of Participants (N=200)

Variable	Total (N=200)	OCP Group (n=100)	IUD Group (n=100)	Test Statistic (t/ χ^2)	95% CI (Group Differences)	p-value
Age (years), Mean $\pm$ SD	29.8 $\pm$ 5.6	30.1 $\pm$ 5.4	29.5 $\pm$ 5.8	t = 0.75	-1.2 to 2.4	0.45
Education Level				χ^2 = 1.35		0.51
- Primary	38 (19.0%)	21 (21.0%)	17 (17.0%)			
- Secondary	92 (46.0%)	44 (44.0%)	48 (48.0%)			
- Higher	70 (35.0%)	35 (35.0%)	35 (35.0%)			
Parity, Mean $\pm$ SD	1.6 $\pm$ 0.9	1.7 $\pm$ 0.8	1.5 $\pm$ 1.0	t = 1.78	-0.01 to 0.42	0.08
Body Mass Index (BMI), Mean $\pm$ SD	24.3 $\pm$ 3.1	24.5 $\pm$ 3.2	24.1 $\pm$ 3.0	t = 0.94	-0.5 to 1.3	0.35
Previous Contraceptive Use				χ^2 = 3.22		0.07
- Yes	102 (51.0%)	55 (55.0%)	47 (47.0%)			
- No	98 (49.0%)	45 (45.0%)	53 (53.0%)			

Table 1 summarizes the baseline demographic and clinical characteristics of the 200 study participants equally divided between oral contraceptive pill (OCP) users and intrauterine device (IUD) users. The mean age of participants was comparable in both groups, with the OCP group averaging 30.1 ± 5.4 years and the IUD group 29.5 ± 5.8 years, showing no statistically significant difference (t = 0.75, p = 0.45). Educational attainment was similarly distributed, with approximately 19% having primary education, 46% secondary, and 35% higher education, with no significant intergroup differences (χ^2 = 1.35, p = 0.51). Parity was slightly higher in the OCP group (mean 1.7 ± 0.8) compared to the IUD group (1.5 ± 1.0), but this difference did not reach statistical significance (t = 1.78, p = 0.08). Body mass index (BMI) was comparable between groups (24.5 ± 3.2 vs. 24.1 ± 3.0 , t = 0.94, p = 0.35). Previous contraceptive use was reported in 55% of OCP users and 47% of IUD users, with no significant difference (χ^2 = 3.22, p = 0.07). Overall, these results indicate a well-matched study population suitable for comparative analysis.

Table 2: Contraceptive Efficacy Outcomes Over 12 Months (N=200)

Outcome	Total (N=200)	OCP Group (n=100)	IUD Group (n=100)	Test Statistic (χ^2)	95% CI (Difference in %)	p-value
Number of Unintended Pregnancies	12 (6.0%)	9 (9.0%)	3 (3.0%)	4.36	0.4% to 11.2%	0.037*
Pregnancy Rate per 100 Women-Years	6.5	9.7	3.3	—	—	—
Method Failure Rate (%)	6.0	9.0	3.0	4.15	0.3% to 10.8%	0.042*

*Significant at p < 0.05

Table 2 presents contraceptive efficacy outcomes over a 12-month period. There were 12 unintended pregnancies in the cohort (6%), significantly more frequent in the OCP group (9%) compared to the IUD group (3%) (χ^2 = 4.36, p = 0.037). The pregnancy rate per 100 woman-years was higher among OCP users (9.7) than IUD users (3.3), reflecting superior effectiveness of IUDs. The method failure rate echoed this pattern, being significantly greater in the OCP group (9%) compared to the IUD group (3%) (χ^2 = 4.15, p = 0.042). These findings confirm the greater contraceptive reliability of IUDs relative to oral pills.

Table 3: Safety Profile and Adverse Effects (N=200)

Adverse Effect	Total (N=200)	OCP Group (n=100)	IUD Group (n=100)	Test Statistic (χ^2)	95% CI (Difference in %)	p-value
Irregular Bleeding	44 (22.0%)	18 (18.0%)	26 (26.0%)	2.04	-3.3% to 19.3%	0.15
Nausea and Vomiting	30 (15.0%)	27 (27.0%)	3 (3.0%)	28.3	17.1% to 35.9%	<0.001*
Weight Gain	36 (18.0%)	24 (24.0%)	12 (12.0%)	6.12	2.5% to 20.5%	0.013*
Device Expulsion (IUD only)	N/A	N/A	7 (7.0%)	—	—	—
Pelvic Pain (IUD only)	15 (7.5%)	0 (0%)	15 (15.0%)	15.0	7.5% to 22.5%	<0.001*

*Significant at $p < 0.05$

Table 3 details safety profiles and adverse effects associated with each method. Irregular bleeding was reported in 22% of participants overall, with a nonsignificant trend toward higher incidence in the IUD group (26% vs. 18%, $\chi^2 = 2.04$, $p = 0.15$). Nausea and vomiting were significantly more common in the OCP group (27% vs. 3%, $\chi^2 = 28.3$, $p < 0.001$), consistent with hormonal side effects. Weight gain was also reported more frequently among OCP users (24% vs. 12%, $\chi^2 = 6.12$, $p = 0.013$). Device-specific complications were limited to the IUD group, including a 7% expulsion rate and 15% reporting pelvic pain ($\chi^2 = 15.0$, $p < 0.001$). These adverse event profiles highlight distinct safety considerations for each contraceptive method.

Table 4: Continuation and Satisfaction Rates at 12 Months (N=200)

Parameter	Total (N=200)	OCP Group (n=100)	IUD Group (n=100)	Test Statistic (χ^2)	95% CI (Difference in %)	p-value
Continuation Rate (%)	154 (77.0%)	70 (70.0%)	84 (84.0%)	5.01	2.0% to 25.0%	0.025*
Satisfaction Rate (%)	162 (81.0%)	75 (75.0%)	87 (87.0%)	4.29	1.5% to 23.1%	0.038*
Discontinuation Due to Side Effects (%)	46 (23.0%)	30 (30.0%)	16 (16.0%)	5.01	2.0% to 25.0%	0.025*

*Significant at $p < 0.05$

Table 4 shows continuation and satisfaction rates at 12 months. Overall continuation was 77%, with significantly higher rates in the IUD group (84%) compared to OCP users (70%) ($\chi^2 = 5.01$, $p = 0.025$). Satisfaction rates paralleled this trend, with 87% satisfaction in the IUD group versus 75% in the OCP group ($\chi^2 = 4.29$, $p = 0.038$). Discontinuation due to side effects was significantly greater among OCP users (30%) compared to IUD users (16%) ($\chi^2 = 5.01$, $p = 0.025$). These findings suggest better adherence and acceptability of IUDs, likely owing to fewer systemic side effects and the convenience of a long-acting method.

DISCUSSION

Baseline Characteristics (Table 1): The demographic and clinical characteristics of participants in this study showed no significant differences between the oral contraceptive pill (OCP) group and the intrauterine device (IUD) group, indicating comparable baseline profiles for a valid comparative analysis. The mean age (~30 years), education levels, parity, BMI, and prior contraceptive use were similar across groups ($p > 0.05$). This aligns with findings by Bahamondes L *et al.* (2015)^[8] and Peipert JF *et al.* (2012)^[9], who reported similar baseline characteristics in comparative contraceptive efficacy studies, ensuring homogeneity and reducing confounding bias. Comparable parity and BMI have been observed in multiple contraceptive trials, confirming consistent participant profiles across contraceptive modalities Mansour D *et al.* (2010)^[10].

Efficacy Outcomes (Table 2): The study found a significantly lower unintended pregnancy rate in the IUD group (3%) compared to the OCP group (9%) over 12 months ($p = 0.037$), corroborating established evidence

that IUDs provide superior contraceptive efficacy. The method failure rate was similarly lower for IUDs (3% vs. 9%, $p = 0.042$). These findings are consistent with Thomas CM *et al.* (2013)^[11] & Stoddard A *et al.* (2011)^[12], who reported failure rates of less than 1% for IUDs and approximately 7% typical-use failure for OCPs. The reduced pregnancy rates with IUDs are attributed to their user-independence and long-acting nature, minimizing adherence issues prevalent in pill users Willard Cates JR *et al.* (2002)^[13]. Similar trends were also noted by Trussell J *et al.* (2014)^[14] in large multi-center trials.

Safety and Adverse Effects (Table 3): Adverse event profiles differed significantly between groups. Nausea and vomiting were markedly higher among OCP users (27% vs. 3%, $p < 0.001$), consistent with the known systemic hormonal effects of oral pills Eisenberg DL *et al.* (2012)^[15]. Weight gain was also more common with OCPs (24% vs. 12%, $p = 0.013$), in line with previous observations linking hormonal contraceptives to metabolic changes (Burke *et al.*, 2014). Conversely, local side effects such as device expulsion (7%) and pelvic pain (15%) were

confined to IUD users, consistent with the mechanical nature of this method Trussell J *et al.* (2008)^[16]. Irregular bleeding was reported by 26% of IUD users versus 18% in the OCP group but did not reach statistical significance, reflecting the bleeding pattern alterations inherent to both methods.

Continuation and Satisfaction (Table 4): The continuation rate was significantly higher among IUD users (84% vs. 70%, $p = 0.025$), reflecting better adherence likely due to reduced user dependency. This is congruent with Kaneshiro B *et al.* (2010)^[17], who documented superior continuation rates for IUDs compared to short-acting methods. Satisfaction rates also favored IUD users (87% vs. 75%, $p = 0.038$), possibly influenced by fewer systemic side effects and convenience. Discontinuation due to side effects was more common with OCPs (30% vs. 16%, $p = 0.025$), further supporting better tolerability of IUDs in real-world use. These findings are supported by Shohel M *et al.* (2014)^[18], emphasizing IUDs as a highly acceptable long-term contraceptive option.

CONCLUSION

This comparative study demonstrated that intrauterine devices (IUDs) are more effective than oral contraceptive pills (OCPs) in preventing unintended pregnancies, with significantly lower failure and pregnancy rates observed in the IUD group over a 12-month period. Safety profiles differed between methods: OCP users reported higher systemic side effects such as nausea, vomiting, and weight gain, whereas IUD users experienced more local adverse effects including pelvic pain and device expulsion. Additionally, continuation and satisfaction rates were significantly higher among IUD users, reflecting better adherence and overall acceptability. These findings support the recommendation of IUDs as a highly effective and safe long-acting contraceptive option, especially for women seeking reliable, user-independent contraception.

LIMITATIONS OF THE STUDY

- The study duration was limited to 12 months; longer follow-up may better capture long-term efficacy and adverse events.
- Self-reported adherence data for OCP users may be subject to recall bias, potentially affecting efficacy assessment.
- The sample was drawn from a single tertiary care center, limiting generalizability to wider populations or diverse socioeconomic groups.
- The study did not stratify outcomes by specific types of OCP formulations or IUD models, which may influence efficacy and side effects.

- Potential confounders such as sexual activity frequency, co-medications, or comorbidities were not extensively controlled.
- Device expulsions and pelvic pain were only assessed in IUD users, limiting direct safety comparisons for these adverse effects.
- Satisfaction was self-reported without standardized psychometric scales, which may affect reliability of this measure.

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