Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 22s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Comparative Outcomes of Postpartum Intrauterine Contraceptive Device (PPIUD) Insertion in Vaginal and Cesarean Deliveries: a Prospective Cohort Study

Muhammad Fadhil Asyraq Rahim[1], Fatmawaty Madya[1], Lenny M. Lisal [1], St. Nur Asni[1]

[1]Department of Obstetrics and Gynecology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia.
***Corresponding Author**
Muhammad Fadhil Asyraq Rahim
Department of Obstetrics and Gynecology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
Email ID muhammadfadhilar13@gmail.com

Cite this paper as: Muhammad Fadhil Asyraq Rahim, Fatmawaty Madya, Lenny M. Lisal , St. Nur Asni, (2025) Comparative Outcomes of Postpartum Intrauterine Contraceptive Device (PPIUD) Insertion in Vaginal and Cesarean Deliveries: a Prospective Cohort Study. *Journal of Neonatal Surgery*, 14 (22s), 144-151.

ABSTRACT

Background : The use of intrauterine devices (IUDs) is associated with several side effects, the most common of which include alterations in the menstrual cycle, dysmenorrhea, and device expulsion. However, comparative data on these outcomes based on mode of delivery vaginal versus cesarean section remain limited in Indonesia. This study aimed to compare clinical outcomes following postplacental IUD insertion in patients who underwent vaginal delivery versus cesarean section.

Methods : This analytical observational study employed a prospective cohort design. The sample included 184 IUD acceptors recruited from Wahidin Sudirohusodo Hospital, Sitti Khadijah 1 Hospital, Syekh Yusuf Gowa Hospital, Fatimah Hospital, and Lapalaloi Hospital Maros. Participants were equally divided into two groups based on delivery method: vaginal delivery (n = 92) and cesarean section (n = 92). Outcome measures included changes in menstrual cycle characteristics, dysmenorrhea, abnormal vaginal discharge, IUD expulsion, continuation rates, and hematological parameters. Statistical analysis was performed using the Chi-square and Wilcoxon tests, with significance set at $P < 0.05$.

Results : There were no statistically significant differences between the vaginal and cesarean delivery groups in terms of menstrual cycle length, number of pads used per day, duration of menstruation, menstrual pain, non-menstrual pelvic pain, abnormal vaginal discharge, spontaneous IUD expulsion, desire to continue IUD use, or hematological parameters at both 6 and 12 months post-insertion ($P > 0.05$).

Cunclusion: *There was no difference in the Outcome of Intrauterine Contraceptive Device (IUD) Use Post-Placenta in patients with vaginal delivery and cesarean section delivery..*

1. INTRODUCTION

Indonesia is a developing country with the fifth-largest population in the world. According to the Ministry of Health of the Republic of Indonesia, the country's population reached 271.06 million in 2020, with a Total Fertility Rate (TFR) of 2.45 higher than the average TFR in the ASEAN region. [1] This large population presents significant challenges in population control and reproductive health management. The postpartum period is recognized as an optimal time for initiating contraception, as women are typically highly motivated to delay subsequent pregnancies during this phase. Despite this, the postpartum contraceptive uptake in Indonesia remains low, with only 13.27% of women using contraception during the postpartum period in 2013. The most commonly used methods were injectables and oral contraceptives. [2] The intrauterine contraceptive device (IUD) is a long-acting reversible contraceptive (LARC) that can be inserted immediately after delivery, specifically following the expulsion of the placenta[3]. There are two main types of IUDs: the copper-containing IUD (Cu T380A) and the levonorgestrel-releasing IUD. Postplacental IUD (PPIUD) insertion prevents fertilization and implantation, with a failure rate of less than 1%. [4,5] IUD offers several advantages, including single-time insertion, cost-effectiveness, and minimal systemic effects. However, its use is also associated with certain side effects, such as increased menstrual bleeding, dysmenorrhea, irregular cycles, and spotting. These adverse effects contribute to high discontinuation rates within the first year of use.[6,7]

Previous studies have compared clinical outcomes of PPIUD insertion following vaginal and cesarean deliveries. Thiam et al. (2015) [8] reported a lower expulsion rate in women receiving Post partum IUD during cesarean section compared to vaginal deliveries, with no significant differences in side effects. Similarly, Diallo et al. (2019) found no significant differences in pain, bleeding, vaginal discharge, infection, or menstrual irregularities between the two groups, though the

expulsion rate remained higher in vaginal deliveries.[9]

Data on the comparative clinical outcomes of PPIUD based on delivery method within the Indonesian context are limited. Therefore, this study aims to investigate and compare the outcomes of postplacental intrauterine contraceptive device (PPIUD) use among patients undergoing vaginal and cesarean deliveries

Methods

This study was an observational analytic with a prospective cohort design. The research was conducted over 1 year from January 2023 to December 2023 at RSUP Wahidin Sudirohusodo, RSIA Sitti Khadijah 1, RS Syekh Yusuf Gowa, RS Fatimah and RS Lapalaloi Maros.

In this study, IUD acceptors were monitored for 6 months and 12 months of use, then the outcomes after IUD use were compared. The inclusion criteria were nulliparous and multiparous women post-vaginal delivery and cesarean section who chose the IUD as their contraceptive method, gestational age ≥ 37 weeks, singleton live pregnancy, good uterine contractions, and willingness to undergo monitoring. Traumatic vaginal delivery with 3rd or 4th degree perineal rupture or complications such as uterine hypotonia/atony or retained placenta, suspected/found anatomical abnormalities on examination or history of uterine anatomical abnormalities, history of abnormal uterine bleeding of unknown cause, presence of uterine myoma, cervical polyp, adenomyosis, malignancy, ovulation disorders, coagulopathy, suspected intrapartum infection (fever, foul-smelling amniotic fluid, leukocytosis [>15,000 /mm3]) and sexually transmitted diseases, as well as postpartum hemorrhage and multiple surgical scars were excluded. The outcomes assessed after 6 months and 12 months of IUD use was non-cyclic abdominal pain, vaginal discharge, expulsion rates, routine blood tests, IUD positin, duration of menstruation, laboratory results, and IUD position from the fundus.

The research was carried out after obtaining ethical clearance from the Health Research Ethics Committee, Faculty of Medicine, Hasanuddin University Makassar number 134/UN4.6.4.5.31/PP36/2023. Statistical analysis was performed using SPSS version 22 for Windows®. A p-value of less than 0.05 was considered statistically significant. Statistical analysis used the Chi-square test and Fisher exact test.

Results

A total of 192 patients who met the inclusion criteria and underwent post-placental intrauterine device (IUD) insertion were initially enrolled in this study. 8 participants were excluded based on predefined dropout criteria, which included 3 cases of IUD expulsion and 5 cases of menstrual disorders. Consequently, the final sample size consisted of 184 participants, with an equal distribution of 92 individuals each in the vaginal delivery and cesarean section groups. Characteristics of study population (table 1)

In the vaginal delivery group, comparison of outcomes at 6 and 12 months post postplacental IUD insertion showed a statistically significant difference in menstrual cycle length and the number of sanitary pads used per day ($P < 0.05$). No significant differences were observed in menstruation duration, dysmenorrhea scores, desire to continue IUD use, hemoglobin concentration, or platelet count ($P > 0.05$). Assessment of non-menstrual pelvic pain, abnormal vaginal discharge, and spontaneous IUD expulsion was inconclusive due to insufficient data for reliable analysis. A significant increase in leukocyte count was observed at 12 months (mean: 9.40 $\times 10^3/\mu L$) compared to 6 months (mean: 7.65 $\times 10^3/\mu L$) post-insertion ($P < 0.05$). (Table 2)

In the group with cesarean section delivery, the comparison of the assessment of the outcome of the length of the menstrual cycle and the use of the number of pads in a day at 6 and 12 months of measurement showed a significant difference ($P <0.05$). While the assessment of the duration of menstruation, menstrual pain scale, desire to continue the IUD, leukocyte levels and hemoglobin levels showed no significant difference between monitoring 6 and 12 months after IUD installation (> 0.05).

Table 4 presents a comparison of menstrual cycle abnormalities at 6 months following postplacental IUD insertion between the vaginal and cesarean delivery groups. Abnormal menstrual cycles were reported in 6 participants (6.5%) in the vaginal delivery group and in 5 participants (5.4%) in the cesarean section group. At 12 months post-insertion (Table 5), abnormal menstrual cycles were observed in 2 participants (2.2%) in the vaginal delivery group and in 1 participant (1.1%) in the cesarean section group.

Additionally, hematological parameters including leukocyte count, hemoglobin concentration, and platelet count were assessed. In the vaginal delivery group, the mean leukocyte count was 9.40 $\times 10^3/\mu L$, hemoglobin level was 12.95 g/dL, and platelet count was 306.93 $\times 10^3/\mu L$. In the cesarean section group, the corresponding mean values were 9.00 $\times 10^3/\mu L$ for leukocytes, 12.91 g/dL for hemoglobin, and 258.83 $\times 10^3/\mu L$ for platelets. A statistically significant difference was found in platelet counts between the two groups ($P < 0.05$), whereas no significant differences were observed in leukocyte or hemoglobin levels ($P > 0.05$)

Parameter	Frequency [n (%)]		P value
	Vaginal Delivery	Cesarean Section	
Age			
<20 years	0 (0.0%)	1 (1.1%)	
20-35 years old	85 (92.4%)	80 (87.0%)	0.361
>35 years old	7 (7.6%)	11 (12.0%)	
pregnancy			
Primigravida	15 (16.3%)	22 (23.9%)	0.270
Multigravida	77 (83.7%)	70 (76.1%)	
Job			
civil servant	13 (14.1%)	17 (18.5%)	0.488
Non-PNS/private	9 (9.8%)	10 (10.9%)	
Self-employed	39 (42.4%)	29 (31.5%)	
Housewife / Not Working	31 (33.7%)	36 (39.1%)	
Education			
Elementary School	10 (10.9%)	13 (14.1%)	0.798
Junior high school	10 (10.9%)	18 (19.6%)	
Senior high school	46 (50.0%)	31 (33.7%)	
Diploma	5 (5.4%)	1 (1.1%)	
Bachelor degree	18 (19.6%)	19 (20.7%)	
Master degree	3 (3.3%)	10 (10.9%)	

Table 1. Characteristics of study population

***Chi-Square test; **Fisher-Exact test; # Wilcoxon test.**

Parameter	Vaginal Delivery		P value
	6 months	12 months	
Menstrual Cycle Length			
Abnormal	11 (12.0%)	3 (3.3%)	* **0.026**
Normal	81 (88.0%)	89 (96.7%)	
Number of Sanitary Napkins a Day			
Heavy	19 (20.7%)	9 (9.8%)	* **0.040**
Currently	73 (79.3%)	83 (90.2%)	
Duration of Menstruation			
Elongated	12 (13.0%)	6 (6.5%)	*0.216
Normal	76 (82.6%)	84 (91.3%)	
Shorten	4 (4.3%)	2 (2.2%)	
Menstrual Pain Scale			
Light	87 (94.6%)	92 (100.0%)	**0.059
Currently	5 (5.4%)	0 (0.0%)	
Non-Menstrual Pain Scale			
Light	92 (100.0%)	92 (100.0%)	
Abnormal Vaginal Discharge			
Normal vaginal discharge	92 (100.0%)	92 (100.0%)	
IUD spontaneously comes out			
No Expulsion	92 (100.0%)	92 (100.0%)	
IUD removal			
Hand : Tool	80 : 20	55 : 45	
Desire to Continue IUD			
Carry on	92 (100.0%)	89 (96.7%)	**0.246
No Continue	0 (0.0%)	3 (3.3%)	
Leukocytes [Mean (SD), µL]	7.65 (1.37)	9.40 (2.10)	# **0.046**

Hemoglobin [Mean (SD), gr/dl]	14.03 (1.06)	12.95 (1.62)	# 0.954
Platelets [Mean (SD), µL]	259.39 (52.30)	306.93 (298.54)	# 0.093

Table 2. Comparison of post-placental IUD placement outcomes after 6 and 12 months in patients with vaginal delivery.

Parameter	Cesarean Section		P value
	6 months	12 months	
Menstrual Cycle Length			
Abnormal	10 (10.9%)	1 (1.1%)	* **0.005**
Normal	82 (89.1%)	91 (98.9%)	
Number of Sanitary Napkins a Day			
Heavy	18 (19.6%)	5 (5.4%)	* **0.015**
Currently	72 (78.3%)	85 (92.4%)	
Light	2 (2.2%)	2 (2.2%)	
Duration of Menstruation			
Elongated	10 (10.9%)	3 (3.3%)	*0.092
Normal	77 (83.7%)	86 (93.5%)	
Shorten	5 (5.4%)	3 (3.3%)	
Menstrual Pain Scale			
Light	87 (94.6%)	92 (100.0%)	**0.059
Currently	5 (5.4%)	0 (0.0%)	
Non-Menstrual Pain Scale			
Light	92 (100.0%)	92 (100.0%)	
Abnormal Vaginal Discharge			
Normal vaginal discharge	92 (100.0%)	92 (100.0%)	
IUD spontaneously comes out			
No Expulsion	92 (100.0%)	92 (100.0%)	
Desire to Continue IUD			
Carry on	92 (100.0%)	90 (97.8%)	**0.497
No Continue	0 (0.0%)	2 (2.2%)	
Leukocytes [Mean (SD), µL]	8.12 (1.48)	9.00 (1.98)	# 0.078
Hemoglobin [Mean (SD), gr/dl]	14.06 (1.00)	12.91 (1.31)	# 0.670
Platelets [Mean (SD), µL]	245.10 (53.46)	258.83 (52.52)	# **0.007**

*Chi-Square test; **Fisher-Exact test; # Wilcoxon test.

Table 3. Comparison of post-placental IUD placement outcomes after 6 and 12 months in patients with cesarean delivery.

Table 4. Comparison of vaginal delivery and cesarean section outcomes 6 months after IUD insertion after placenta.

Parameter	6 months		P value
	Vaginal Delivery	Cesarean Section	
Menstrual Cycle Length			
Abnormal	6 (6.5%)	5 (5.4%)	*1,000
Normal	86 (93.5%)	87 (94.6%)	
Number of Sanitary Napkins a Day			
Heavy	10 (10.9%)	9 (9.8%)	*0.357
Currently	82 (89.1%)	81 (88.0%)	
Light	0 (0.0%)	2 (2.2%)	
Duration of Menstruation			
Elongated	6 (6.5%)	5 (5.4%)	*0.904
Normal	82 (89.1%)	82 (89.2%)	
Shorten	4 (4.3%)	5 (5.4%)	

Menstrual Pain Scale			
Light	87 (94.6%)	87 (94.6%)	*1,000
Currently	5 (5.4%)	5 (5.4%)	
Non-Menstrual Pain Scale			
Light	92 (100.0%)	92 (100.0%)	
Abnormal Vaginal Discharge			
Normal Vaginal Discharge	92 (100.0%)	92 (100.0%)	
IUD spontaneously comes out			
No Expulsion	92 (100.0%)	92 (100.0%)	
Desire to Continue IUD			
Carry on	92 (100.0%)	92 (100.0%)	
No Continue	-	-	
IUD Distance [Mean (SD), mm]	7.27 (6.02)	5.54 (3.50)	# **0.034**
Leukocytes [Mean (SD), µL]	7.65 (1.37)	8.12 (1.48)	# **0.031**
Hemoglobin [Mean (SD), gr/dl]	14.03 (1.06)	14.06 (1.00)	# 0.890
Platelets [Mean (SD), µL]	259.39 (52.30)	245.10 (53.46)	# 0.058

*Chi-Square test; **Fisher-Exact test; # Mann-Whitney test.

Table 5. Comparison of vaginal delivery and cesarean section outcomes 12 months after post-placental IUD insertion.

Parameter	12 months		P value
	Vaginal Delivery	Cesarean Section	
Menstrual Cycle Length			
Abnormal	2 (3.3%)	1 (1.1%)	**1,000
Normal	90 (97.8%)	91 (98.9%)	
Number of Sanitary Napkins a Day			
Heavy	5 (5.4%)	3 (3.3%)	*0.287
Currently	87 (94.6%)	87 (94.6%)	
Light	0 (0.0%)	2 (2.2%)	
Duration of Menstruation			
Elongated	3 (3.3%)	2 (2.2%)	*0.819
Normal	87 (94.6%)	87 (94.6%)	
Shorten	2 (2.2%)	3 (3.3%)	
Menstrual Pain Scale			
Light	92 (100.0%)	92 (100.0%)	
Currently	-	-	
Non-Menstrual Pain Scale			

Light	92 (100.0%)	92 (100.0%)	
Abnormal Vaginal Discharge			
Normal Vaginal Discharge	92 (100.0%)	92 (100.0%)	
IUD spontaneously comes out			
No Expulsion	92 (100.0%)	92 (100.0%)	
Desire to Continue IUD			
Carry on	89 (96.7%)	90 (97.8%)	**1,000
No Continue	3 (3.3%)	2 (2.2%)	
IUD Distance [Mean (SD), mm]			
Leukocytes [Mean (SD), µL]	9.40 (2.10)	9.00 (1.98)	#0.143
Hemoglobin [Mean (SD), gr/dl]	12.95 (1.62)	12.91 (1.31)	#0.556
Platelets [Mean (SD), µL]	306.93 (298.54)	258.83 (52.52)	#**0.025**

*Chi-Square test; **Fisher-Exact test; # Mann-Whitney test.

2. DISCUSSION

This study evaluated comparative outcomes of postplacental intrauterine device (IUD) insertion following vaginal delivery versus cesarean section, assessed at 6 and 12 months post-insertion. Parameters measured included menstrual cycle length, number of sanitary pads used per day, duration of menstruation, and hemoglobin levels. No statistically significant differences were observed between the two delivery methods at either 6 or 12 months post-insertion ($P > 0.05$).

These findings align with previous study reported by Diallo, who investigated differences in expulsion rates, menstrual cycle changes, and infection following postplacental IUD insertion in vaginal and cesarean deliveries. Their study similarly found no significant difference in menstrual cycle irregularities between the two groups, with 2.1% of women in the vaginal delivery group and 1.8% in the cesarean section group reporting increased menstrual bleeding [9]. These symptoms may be influenced by the insertion method, and management often includes administration of hemostatic agents.

The current study also found no difference in the volume of menstrual bleeding between delivery methods. According to literature, IUD insertion immediately after cesarean delivery can affect menstrual patterns due to structural and hormonal changes in the uterus and surrounding tissues, as well as postoperative inflammatory responses. [10]

While previous studies have demonstrated increased menstrual volume following copper IUD insertion, few have characterized bleeding frequency. Hubacher reported that approximately 20% of women experienced intermenstrual spotting, averaging one day per cycle during the first year of copper IUD use.[11] In contrast, Diedrich et al. (2015) found no change in bleeding frequency, with many users maintaining regular cycles during the first 3–6 months. Although initial users often reported increased cramping and heavy bleeding, these symptoms diminished over time, with less than 50% reporting continued symptoms after 6 months.

This study also found no significant difference in the incidence of dysmenorrhea between delivery methods, with 87% of participants in both groups reporting menstrual pain. Diallo et al. reported lower rates of pain: 3.6% in the cesarean group and 1.1% in the vaginal delivery group. Pain is a common complaint among IUD users. Ousmane et al. (2015) found that 11.8% of women with cesarean deliveries reported pain, compared to 25% of those with vaginal deliveries. Dysmenorrhea is often associated with increased inflammatory prostaglandins due to the IUD and may be managed with nonsteroidal anti-inflammatory drugs (NSAIDs), which often reduce or resolve symptoms over time.

No IUD expulsions were observed in this study in either delivery group. Expulsion is a relatively rare complication, generally occurring in less than 5% of cases. This finding is consistent with Arisanti et al. (2020), who reported no expulsions among 48 cesarean IUD recipients and an 8% expulsion rate among vaginal delivery recipients.

Similarly, Halder et al. (2016) reported an expulsion rate of 4% for vaginal deliveries and 2% for cesarean sections. Thiam et al. found rates of 3.5% and 2%, respectively. The postpartum period is a high-risk time for IUD expulsion, primarily due to the enlarged uterine cavity. Other contributing factors include insertion technique and the distance between the IUD and the uterine fundus (Ousmane et al., 2015; Diallo et al., 2019; Halder et al., 2016). Expulsion typically occurs within the first few months post-insertion. Rates vary across studies and geographic locations (Nelson et al., 2009).

A study conducted in Turkey reported a 12.3% expulsion rate for postplacental IUD insertions. In contrast, E. Levi et al.

found no expulsions within six months postpartum. Differences in these findings may be attributed to timing, technique, and method of insertion. While cesarean placement appears to carry a lower risk of expulsion compared to vaginal delivery, both are associated with higher risks than interval insertions (Eroğlu et al., 2006; Kapp & Curtis, 2009; Levi et al., 2012).

In this study, none of the IUD users expressed a desire for removal at 6 months post-insertion, regardless of delivery method. At 12 months, only 2% of vaginal delivery users and 3% of cesarean delivery users requested removal. The IUD used in this study was the copper T device. Prior research has shown that some women discontinue use due to adverse effects, with the most commonly reported reasons being cramping and heavy bleeding during the first year. [12] Perceived changes in vaginal bleeding may influence user satisfaction, acceptance, and continuation of IUD use.

No cases of abnormal vaginal discharge were reported in this study among either delivery group. Similar findings have been reported, with a lower incidence of leukorrhea during the first year of use compared to extended use. Vaginal discharge may be triggered by foreign body reactions to the IUD, potentially promoting Candida overgrowth, leading to candidiasis and increased discharge. Such infections can result from improper aseptic technique during insertion or from pre-existing lower reproductive tract infections. [13]

Leukorrhea is a minimal-risk complication that typically occurs in the early post-insertion phase, especially within the first 20 days. It is often associated with insertion technique or pre-existing infections rather than the IUD itself. Vaginal ecosystem instability, influenced by cervical mucus, hormonal status, foreign objects (IUDs, tampons), sexual behavior, medications, or dietary habits, may also contribute. [14]

Copper IUDs are recognized as foreign bodies, triggering a prolonged local inflammatory response in the endometrium. This inflammatory environment may promote bacterial growth, potentially leading to infection and elevated leukocyte counts. [15,16] Following vaginal delivery, the IUD is inserted through the cervical canal into the uterine cavity, which may cause localized irritation and a mild immune response. Leukocytosis may occur locally but does not usually lead to systemic inflammation. In contrast, cesarean delivery elicits a broader inflammatory response due to surgical trauma, often resulting in a transient leukocytosis within the first 1–3 days postoperatively.

In the present study, no significant increase in leukocyte counts was observed at 6 months post-insertion. Furthermore, there was no statistically significant difference in leukocyte elevation between the two delivery groups. A significant difference was observed in the IUD–fundal distance between delivery methods; however, all measurements remained within 9 mm. The fundal distance is influenced more by uterine cavity size than by IUD displacement. In larger uteri, the clinical relevance of a fundal distance under 9 mm is minimal. In contrast, in smaller uteri (e.g., nulliparous women), even a 2 cm distance may result in partial descent into the cervical canal. [17]

This study has several limitations. Data collection relied on self-reported questionnaires, which may introduce subjective bias. Additionally, the follow-up period was limited to 12 months, whereas long-acting contraceptives like IUDs are typically evaluated over multiple years (up to five years or more). Other potential confounding factors such as hygiene, baseline menstrual cycle history, and uterine size were not fully controlled, which may have influenced the outcomes.

3. CONCLUSIONS

There were no significant differences in clinical outcomes following postplacental intrauterine device (IUD) insertion between patients who underwent vaginal delivery and those who underwent cesarean section. Parameters assessed—including menstrual cycle length, number of sanitary pads used per day, duration of menstruation, dysmenorrhea, non-menstrual pelvic pain, abnormal vaginal discharge, spontaneous IUD expulsion, willingness to continue IUD use, and hematologic findings showed no significant variation at either 6 months or 12 months post-insertion.

Acknowledgments

The authors would like to express their sincere gratitude to Hasanuddin University and Wahidin sudirohusodo Hospital for their valuable contributions to this research. We are also grateful to all my friends for their insightful comments and suggestions that improved the quality of this manuscript.

Authors' Contributions

MF: Validation, visualization, formal analysis, writing – original draft. F.M.: Conceptualization, writing–review & editing. LL.: Conceptualization, software, supervision, validation, visualization, writing–review & editing. SFA.: Data curation, investigations.

Conflict of Interest

The authors declare no conflicts of interest related to the research, authorship, or publication of this article

REFERENCES

[1] Kementerian Kesehatan Republik Indonesia. Panduan Pelayanan Keluarga Berencana dan Kesehatan Reproduksi dalam Situasi Pandemi COVID-19. Jakarta: Kementerian Kesehatan RI; 2020

[2] Mujiati. Pelayanan KB Pasca Persalinan dalam Upaya Mendukung Percepatan Penurunan Angka Kematian Ibu. Buletin Jendela Data Informasi dan Kesehatan. 2013;2(2):11–6.

[3] Peipert JF, Zhao Q, Allsworth JE, Petrosky E, Madden T, Eisenberg D, et al. Continuation and satisfaction of reversible contraception. Obstet Gynecol. 2011;117(5):1105–13.

[4] Canning D, Shah IH, Pearson E, et al. Institutionalizing postpartum intrauterine device (IUD) services in Sri Lanka, Tanzania, and Nepal: study protocol for a cluster-randomized stepped-wedge trial. BMC Pregnancy Childbirth. 2016;16(1):362.

[5] Apter D, Gemzell-Danielsson K, Hauck B, Rosen K, Zurth C. Pharmacokinetics of two low-dose levonorgestrel-releasing intrauterine systems and effects on ovulation rate and cervical function: pooled analyses of phase II and III studies. Fertil Steril. 2014;101(6):1656–62.e1–4.

[6] Goldstuck ND, Cheung TS. The efficacy of intrauterine devices for emergency contraception and beyond: a systematic review update. Int J Womens Health. 2019;11:471–9.

[7] Lanzola EL, Auber M, Ketvertis K. Intrauterine Device Placement and Removal. [Updated 2025 Feb 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557403/

[8] Thiam O, Cissé ML, Ndiaye P, Thiam M, Tendeng JN, Gueye M, et al. The intra-uterine device (IUD) of the immediate postpartum: a comparative study between the caesarean IUD and the IUD inserted after a natural delivery. Clin Obstet Gynecol Reprod Med. 2015;1(3):87–92.

[9] Diallo M, Daff H, Diouf A, Niass A, Toure Y, Fall K, et al. Intrauterine device in the immediate postpartum: study comparing insertion after cesarean section and vaginal delivery. Open J Obstet Gynecol. 2019;9:1510–8.

[10] Gordon A, Benecke A. Postpartum hormonal and structural uterine changes after cesarean section. 2020. [Unpublished/Book – please verify source for proper citation].

[11] Hubacher D, Chen PL, Park S. Side effects from the copper IUD: do they decrease over time? Contraception. 2009;79(5):356–62.

[12] Diedrich JT, Desai S, Zhao Q, Secura G, Madden T, Peipert JF. Association of short-term bleeding and cramping patterns with long-acting reversible contraceptive method satisfaction. Am J Obstet Gynecol. 2015;212(1):50.e1–8.

[13] Kasdu D. Solusi Problem Wanita Dewasa. Jakarta: EGC; 2008.

[14] Pudiastuti RD. Tiga Fase Penting Pada Wanita. Solo: PT Elex Media Komputindo; 2012.

[15] Ortiz ME, Croxatto HB. Copper-T intrauterine device and levonorgestrel intrauterine system: biological bases of their mechanism of action. Contraception. 2007;75(6 Suppl):S16–30.

[16] Chou CH, Chen SU, Shun CT, et al. Divergent endometrial inflammatory cytokine expression at peri-implantation period and after the stimulation by copper intrauterine device. Sci Rep. 2015;5:15157.

[17] Tal MG, Reeves MF, Hathaway MJ, et al. A proposed classification for intrauterine device position: the Tal-Reeves classification. BMJ Sex Reprod Health. 2022;48:157–9.

..