Original Article

Comparison of the Mean Duration of 3rd Stage of Labour Between Intraumbilical and Intravenous Oxytocin

Anam Javed[1], Saba Nadeem[2]

[1,2]Department of Obstetrics & Gynecology, Sadiq Abbasi (Civil) Hospital, Bahawalpur, Pakistan

Correspondence: *Dr. Anam Javed*
2Department of Obstetrics & Gynecology, Sadiq Abbasi (Civil) Hospital, Bahawalpur, Pakistan
dranamjavedmirza@gmail.com

Abstract

Objective: To compare the mean duration of third stage of labour (TSL) between intraumbilical (IU) and intravenous (IV) oxytocin.
Methodology: This randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Sadiq Abbasi Hospital, Bahawalpur, Pakistan, from October 2024 to March 2025. One hundred women aged 18–40 years with term singleton pregnancies and spontaneous vaginal delivery were enrolled and randomly allocated to receive either IU (10 U in 10 mL saline) or IV oxytocin (20 U in 500 mL saline). Data were analyzed using SPSS version 26.0, with group comparisons performed using appropriate statistical tests, considering $p<0.05$ as significant.
Results: A total of 100 women were enrolled, with mean age of 27.6±4.4 years. The median duration of the TSL was significantly less in the IU oxytocin group compared to the IV group, at 2.5 minutes (IQR: 2.1–3.2) versus 3.4 minutes (IQR: 3.0–3.8), respectively ($p<0.001$). Postpartum hemorrhage ($p=0.400$), need for additional uterotonics ($p=0.558$), maternal tachycardia ($p=0.646$), and maternal hypotension ($p=0.558$) were relatively similar among study groups.
Conclusion: Intraumbilical oxytocin significantly shortens the duration of the TSL compared to intravenous oxytocin.
Keywords: Intraumbilical, intravenous, labour, oxytocin, Postpartum hemorrhage.

Cite this article as: Javed A, Nadeem S. Comparison of the Mean Duration of 3rd Stage of Labour between Intraumbilical and Intravenous Oxytocin. J Soc Obstet Gynaecol Pak. 2026; 16(2):112-116. DOI. 0.71104/jsogp.v16i2.1046

Introduction

Maternal morbidity and mortality are notable among developing countries, especially due to postpartum hemorrhage (PPH).[1] In order to deal with the third stage of labour (TSL), active management and expectant management are two commonly adopted approaches. The TSL generally completes in 6-30 minutes, and longer duration of TSL is associated with higher risk of PPH. Active management aims to reduce the span of TSL, and it can minimize the risk of PPH in as much as 60% women.[2,3]

Oxytocin is regarded as the gold standard for PPH prevention, but oxytocin requires a parenteral route, while some experts describe oxytocin via umbilical vessels to markedly reduce the TSL duration, TSL loss, and decline in hemoglobin (Hb) in the postpartum period.[4] In the active management of TSL, 10 units of IV oxytocin is usually administered within 2 minutes following delivery of the baby, whereas the action of onset is immediate and lasts for 1 hour.[5,6] A study analyzing 100 women, placental separation time was 4.8±1.2 minutes in the IV oxytocin group, versus 1.7±0.7 minutes in the IU group ($p<0.001$).[7] Another research reported the mean duration of TSL as 1.7±0.9 minutes in IU group, vs. 2.5±0.7 minutes in the IV group ($p<0.001$).[8] Ahsan et al., showed the mean duration of TSL much lower with IU oxytocin vs. controls (4.3±1.5 vs 9.4±2.8 minutes, $p<0.001$).[9] IV oxytocin acts rapidly through systemic circulation to stimulate uterine contractions, whereas IU oxytocin may exert a more localized effect by reaching the placental bed and adjacent uterine wall more directly, thereby facilitating retroplacental myometrial contraction, placental separation, and earlier placental expulsion[8,9]

Although a few local studies have evaluated the use of IU oxytocin during the TSL, the available local evidence

Authorship Contribution: [1]Data collection, drafting, proof reading, approved for publication, [2]Concept and design, data analysis, critical revisions, approved for publication.

Funding Source: none
Conflict of Interest: none

Received: Jan 10, 2026 Revised: Mar 25, 2026
Accepted: April 09, 2026

remains limited by small sample sizes, single-center settings, and methodological variability, including differences in comparator groups and administration protocols. IU oxytocin has not been adopted uniformly in routine obstetric practice, and its comparative effectiveness against the more commonly used IV route remains insufficiently established in our local population. Therefore, the present study may add context-specific evidence that may help inform routine clinical practice in our setting.

Prolongation of the third stage of labour is associated with increased postpartum blood loss and a higher risk of postpartum hemorrhage, making timely placental delivery clinically important. There is always a debate for choosing the best method for management of TSL in the general practice for reducing the duration of TSL. While intraumbilical oxytocin has shown promising results in some previous studies, the evidence remains heterogeneous and its superiority over the standard intravenous route has not been conclusively established, particularly in local practice. It was hypothesized that there is a difference in mean duration of TSL between IU, and IV oxytocin. The aime was to compare the mean duration of TSL between IU, and IV oxytocin

Methodology

This randomized controlled trial was conducted at the Department of Obstetrics and Gynecology, Sadiq Abbasi Hospital, Bahawalpur, Pakistan, from October 2024 to March 2025, after getting approval from the institutional ethical review committee (No: 2304/DME/QAMC Bahawalpur). This trial was registered as NCT07053930 (https://clinicaltrials.gov). A sample size of 100 (50 in each group) was calculated considering the expected mean duration of the TSL as 1.703±0.918 minutes in IU group versus 2.53±0.765 minutes in the intravenous group,[8] with a 5% level of significance and 80% power of the study. The sampling technique used for sample selection was non-probability consecutive sampling. Females aged 18-40 years undergoing spontaneous vaginal delivery were included. Only those women with singleton pregnancy, with a gestational age >37 weeks (on LMP), parity l-5, and any gravidity were enrolled. The exclusion criteria were females with intrauterine fetal death, malpresentation, polyhydramnios, premature rupture of membranes (PROM), or hypertensive disorders. Informed written consent for participation in the study was obtained after explaining the objective and safety of the study to patients/caregivers.

Patients fulfilling the eligibility criteria went through documentation of their demographics, which included age, along with clinical information such as gestational age, gravidity, parity, height, weight, booking status (unbooked/booked), and body mass index (BMI). BMI >25 was taken as obese. Women were then randomly placed by the lottery method into two equal groups. Group-A (IU group) patients were given 10 U of IU oxytocin, diluted in 10 mL of normal saline. While in Group-B (IV group), patients received 20 U of intravenous oxytocin diluted in 500 mL of normal saline.

Placental delivery was performed through controlled cord traction and uterine massage in all women. Labour was actively monitored by the partograph. TSL duration were recorded using a stopwatch, as the time from the completed delivery of the newborn until the completed delivery of the placenta. Maternal tachycardia was defined as heart rate>100/min. PPH was defined as an estimated blood loss >500 mL following vaginal delivery within 24 hours of birth. Maternal hypotension was described as a systolic blood pressure < 100 mmHg, or >20% fall from the baseline measurement, occurring within 15 minutes of oxytocin administration during or after TSL.

Data were analyzed using IBM-SPSS Statistics, version 26.0. The qualitative variables were represented as frequency and percentage. The Shapiro-Wilk test was used to check the normality of the numeric data, and for the representation, mean and standard deviations (SD) or medians and interquartile ranges (IQR) were computed (as appropriate). Comparison of various study variables was made across groups by independent t-test or Mann-Whitney U test, or chi-square or fisher's exact test, taking p-value <0.05 as significant.

Results

Among 100 women, the mean age was 27.6±4.4 years. The mean age of participants 27.4±4.6 years in the IU group, and 28.0±4.1 years in the IV group (p=0.493). Overall, 63 (63.0%) women were booked cases (p=0.534). Parity (p=0.862), and gravidity (p=0.936) distributions were statistically similar across groups. There were 18 (36.0%) women in the IU group, and 21 (42.0%) in the IV group who had BMI > 25 kg/m² (p=0.539). The baseline mean haemoglobin level were statistically similar among groups (p=0.652). Table I

has details about the comparison of characteristics of women among study groups.

The median duration of the TSL was significantly less in the IU oxytocin group compared to the IV group, at 2.5 minutes (IQR: 2.1–3.2) versus 3.4 minutes (IQR: 3.0–3.8), respectively (p<0.001). The median duration of the TSL was significantly less in the IU oxytocin group compared to the IV group, across BMI, parity and baseline Hb status, and the details are shown in table II. Post-partum hemorrhage (p=0.400), need for additional uterotonics (p=0.558), maternal tachycardia (p=0.646), and maternal hypotension (p=0.558) were relatively similar among study groups.

Discussion

This study exhibited significant reduction in the duration of TSL in the IU oxytocin group compared to the IV group (p<0.001). These findings aligns closely with Ahsan et al. who observed a markedly reduced mean duration of TSL in women administered IU, reporting a mean of 4.33±1.52 minutes compared with 9.40±2.77 minutes in the control group (p<0.001).[9] Makvandi et al.[10] demonstrated a mean TSL of 3.50 minutes in the IU oxytocin group, which compared favorably with both placental cord drainage and no intervention, underscoring the role of IU oxytocin in active TSL management. The current study's results are consistent with these findings, although a slightly shorter median TSL is observed, likely attributable to standardized protocols for placental delivery and uterine massage implemented as part of institutional practice, as well as the exclusion of women with medical comorbidities and labour complications. Tehseen et al.,[11] reported a mean duration of 2.59 minutes in the IU oxytocin group compared to 7.67 minutes among controls (p<0.001).

These findings are reinforced by the observations of Khalid et al.,[12] who documented a significant reduction in mean TSL to 4.4±0.9 minutes with IU oxytocin, compared to 5.1±1.3 minutes in controls (p=0.001). In a large prospective clinical trial, Devi and Bhatnagar randomized 600 women to IU, IV, and IM oxytocin.[13] The IU group demonstrated the shortest mean TSL and least blood loss, confirming the superiority of this route for prompt placental separation and haemostasis.

Nankali et al.[14] also reported a significant reduction in TSL in the IU group compared to placebo (4.2±3.3 min vs. 10.7±7.4 min, p<0.01), with a lower need for manual placental removal. No cases of retained placenta were noted and placental expulsion occurred without complication in all women. Some researchers documented no statistically significant reduction in TSL between saline and IU oxytocin groups.[15] Salama et al.,[16] observed no major difference in TSL duration or blood loss between IU, sublingual misoprostol, or

Table I: Comparison of characteristics. (N=100)

Characteristics		Intraumbilical oxytocin (n=50)	Intravenous oxytocin (n=50)	P-value
Age (years), mean±SD		27.4±4.6	28.0±4.1	0.493
Gestational age (weeks), mean±SD		38.6±1.2	38.7±1.0	0.652
Gravidity, median with IQR		2 (1-3)	2 (1-3)	0.936
Parity, median with IQR		2 (1-3)	2 (1-3)	0.862
Booking status	Booked	33 (66.0%)	30 (60.0%)	0.534
	Unbooked	17 (34.0%)	20 (40.0%)	
BMI>25 kg/m^2		18 (36.0%)	21 (42.0%)	0.539
Hemoglobin (g/dl), mean±SD		11.1±1.2	11.0±1.0	0.652

Table II: Comparison of maternal outcomes. (N=100)

Outcomes		Intraumbilical oxytocin (n=50)	Intravenous oxytocin (n=50)	P-value
Duration of TSL (min), median with IQR		2.5 (2.1-3.2)	3.4 (3.0-4.8)	<0.001
Post-partum hemorrhage		2 (4.0%)	4 (8.0%)	0.400
Need for additional uterotonics		1 (2.0%)	2 (4.0%)	0.558
Maternal tachycardia		2 (4.0%)	3 (6.0%)	0.646
Maternal hypotension		1 (2.0%)	2 (4.0%)	0.558
BMI	≤25 kg/m²	2.4 (2.0–3.0)	3.3 (2.9–4.1)	0.001
	>25 kg/m²	2.7 (2.2–3.4)	3.6 (3.1–4.9)	0.012
Parity	1	2.6 (2.1–3.3)	3.5 (3.0–4.6)	0.009
	2–3	2.4 (2.0–3.1)	3.3 (2.9–4.0)	0.002
	4–5	2.7 (2.3–3.5)	3.6 (3.2–4.8)	0.028
Baseline hemoglobin	<11 g/dL	2.6 (2.1–3.3)	3.5 (3.0–4.7)	0.011
	≥11 g/dL	2.4 (2.0–3.1)	3.3 (2.9–4.1)	0.001

standard active management of TSL. These inconsistencies are likely related to methodological and population differences rather than absence of treatment effect alone. Studies comparing IU oxytocin against placebo, saline, or routine management would be expected to show a larger effect size than studies, such as the present one, using an active IV oxytocin comparator. Differences in oxytocin dosage, timing of administration, criteria for active management, and inclusion of women with varying obstetric risk may also explain the variability in findings. Baseline risk, including medical disorders, multiparity, or other factors affecting uterine contractility and placental separation, may further contribute to divergent results.

An important point is that the present trial compared two active oxytocin strategies rather than oxytocin versus placebo or routine care alone. This makes the observed difference clinically relevant, because it suggests that route of administration may influence the efficiency of placental separation even when both groups receive standard third stage care. In that sense, the study adds value beyond existing local data by addressing a more practice-oriented question in a contemporary Pakistani tertiary care setting.

Reduction in blood loss during and after delivery is a key objective of TSL management. The clinical significance of this reduction is underscored by the high global burden of PPH, particularly in resource-limited settings.[16,17] The relatively lower PPH trend observed in this study, although not statistically significant, is still clinically relevant and aligns directionally with findings reported by Bu et al.,[4] and Tehseen et al.[11] The absence of statistical significance may reflect the modest sample size, low overall event frequency, and exclusion of high-risk pregnancies, all of which reduce the ability to detect differences in secondary maternal outcomes.

This is particularly relevant in settings where IV infusion may already be in use, yet optimization of route could still improve third stage outcomes. The present study therefore contributes locally applicable comparative evidence rather than duplicating earlier work, because it evaluates whether IU oxytocin retains benefit over IV oxytocin under standardized active management conditions.

Maternal side effects such as tachycardia and hypotension were infrequent and comparable between the IU, and IV oxytocin groups, reflecting the overall safety. These findings mirror observations in the trials by Tehseen et al.[11] and Nankali et al.[14] where the safety profile was comparable and side effects were rare. Salama et al.[2] did not identify significant differences in the incidence of maternal complications between IU and other routes. This study did not observe neonatal outcomes but others like Devi and Bhatnagar,[13] as well as Sabir et al.,[19] asserted that IU oxytocin did not compromise neonatal well-being when administered as part of active management of TSL.

The consistency of findings across the majority of published trials indicates that IU administration of oxytocin offers a clinically relevant advantage in the reduction of TSL, without increasing other relevant outcomes. The practical implications of these findings are significant in settings where rapid placental delivery and prompt uterine contraction are critical to minimizing maternal morbidity and mortality.[21,22] The use of IU oxytocin, particularly in low-resource environments, may facilitate more efficient and safer TSL management, contributing to reductions in PPH and the associated need for blood transfusion or manual intervention.[23,24] Implementation of IU oxytocin could thus form part of evidence-based guidelines for active management, especially in facilities lacking immediate surgical backup.

The exclusion of high-risk pregnancies limits the applicability of findings to the general obstetric population, suggesting a need for trials that include women with medical comorbidities, multiple gestation, or abnormal placentation. Neonatal outcomes beyond the immediate postpartum period were not evaluated. Future studies could incorporate blinded outcome assessment, objective measures of blood loss, and larger sample sizes to enhance validity and generalizability.

Conclusion

Intraumbilical oxytocin significantly shortens the duration of the TSL compared to intravenous oxytocin. The integration of intraumbilical oxytocin into active management protocols may further enhance maternal outcomes in both resource-limited and tertiary care settings. The adoption of standardized administration, rigorous randomization, objective outcome measurement, and inclusion of higher-risk pregnancies in future research may facilitate the translation of these findings into a wider clinical practice.

References

1. Begley CM, Gyte GML, Devane D, McGuire W, Weeks A, Biesty LM. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev. 2019;2(2):CD007412. https://doi.org/10.1002/14651858.CD007412.pub5
2. Fissahaye B, Dheresa M, Assefa N, Tesfaye D, Eyeberu A, Balis B, et al. Active management of the third stage of labor and associated factors among maternity care providers in public health facilities in Eastern Ethiopia: a multi-center study. BMC Pregnancy Childbirth. 2023;23(1):701. https://doi.org/10.1186/s12884-023-06009-2
3. Behuria S, Sahu M, Mohanty M, Behera S, Mohapatra K, Patnaik R, et al. A comparative study of the efficacy of intraoperative intravenous oxytocin and intramuscular oxytocin versus conventional intramuscular oxytocin for third-stage labour in elective cesarean section. Cureus. 2023;15(2):e35026. https://doi.org/10.7759/cureus.35026
4. Bu SW, Alas-Pineda C, Aguilar-Andino D, Norwood DA, Gaitán-Zambrano K, Pinto-Romero M. Intraumbilical versus intramuscular oxytocin in the management of the third stage of labor. Obstet Gynecol Sci. 2023;66(2):76-83. https://doi.org/10.5468/ogs.22184
5. Habiba UE, Kiani SA, Azam B, Rafique A, Naseem U, Noureen S. Comparison of intravenous (IV) oxytocin with IV oxytocin plus sublingual misoprostol for active management of third stage of labor in vaginal birth among primigravida with singleton pregnancy. J Soc Obstet Gynaecol Pak. 2022;12(3):205-9.
6. Yusef AH, Dayoub M, Abdullah R. A comparison between intravenous and intraumbilical vein of oxytocin in management of third stage of labor. Tishreen Univ J Res Sci Stud Med Sci Ser. 2020;42(4):193-205.
7. Saqib S, Umer S, Khanam S, Mudassir AQ, Bano N, Mubashir H. Comparison of intravenous versus intra-umbilical oxytocin for blood loss and placental separation time for active management of third stage of labour. Pak J Med Health Sci. 2022;16(9):298-9. https://doi.org/10.53350/pjmhs22169298
8. Sharma I, Prabhakar M, Neerja, Raghav SK. A comparative study of the efficacy of the intraumbilical and intravenous oxytocin in the management of third stage of labour. Int J Med Res Prof. 2018;4(2):180-4. https://doi.org/10.21276/ijmrp.2018.4.2.040
9. Ahsan A, Noor M, Wajid R. Comparison of mean duration of 3rd stage of labour in patients treated with and without intraumbilical vein injection of oxytocin. Pak Postgrad Med J. 2023;34(1):18-22. https://doi.org/10.51642/ppmj.v34i01.510
10. Makvandi S, Zargar Shoushtari S, Zaker Hosseini V. Management of third stage of labor: a comparison of intraumbilical oxytocin and placental cord drainage. Shiraz E-Med J. 2013;14(2):83-90. https://brieflands.com/articles/semj-20339
11. Tehseen F, Anwar A, Arfat Y. Intraumbilical venous injection oxytocin in the active management of third stage of labour. J Coll Physicians Surg Pak. 2008;18(9):551-4. https://www.jcpsp.pk/archive/2008/Sep2008/06.pdf
12. Khalid T, Malik NA, Sarfraz Z. Effect of intraumbilical oxytocin on duration of third stage of labour. J Rawalpindi Med Coll. 2017;21(3):211-4. https://www.journalrmc.com/index.php/JRMC/article/view/24
13. Devi AM, Bhatnagar K. The third stage of labour: to bleed or not to bleed - revised role of intra-umbilical oxytocin in management of third stage of labour. Int J Reprod Contracept Obstet Gynecol. 2017;6(5):1982-5. https://doi.org/10.18203/2320-1770.ijrcog20171962
14. Nankali A, Keshavarzi F, Fakheri T, Zare S, Rezaei M, Daeichin S. Effect of intraumbilical vein oxytocin injection on third stage of labor. Taiwan J Obstet Gynecol. 2013;52(1):57-60. https://doi.org/10.1016/j.tjog.2013.01.010
15. Ghulmiyyah LM, Wehbe SA, Saltzman SL, Ehleben C, Sibai BM. Intraumbilical vein injection of oxytocin and the third stage of labor: randomized double-blind placebo trial. Am J Perinatol. 2007;24(6):347-52. https://doi.org/10.1055/s-2007-981854
16. Salama HF, Afifi MF, Kandil MS, Sayed TM. Effects of different administration methods using different pharmacological agents on the third stage of labor: a comparative study. Menoufia Med J. 2022;35(1):36.
17. Wang MJ, Oyelese Y. Postpartum hemorrhage. Matern Fetal Med. 2025;7(1):38-48. https://doi.org/10.1097/FM9.0000000000000261
18. Amanuel T, Dache A, Dona A. Postpartum hemorrhage and its associated factors among women who gave birth at Yirgalem General Hospital, Sidama Regional State, Ethiopia. Health Serv Res Manag Epidemiol.2021;8:23333928211062777. https://doi.org/10.1177/23333928211062777
19. Sabir A, Haider S, Ghaffar S, Sattar S, Maryam S, Aamir A, et al. Effect of intraumbilical (IU) vein oxytocin injection on duration of third stage of labour: a comparative study. Pak J Health Sci. 2024;5(10):110-3. https://doi.org/10.54393/pjhs.v5i10.2506
20. Sawai D, Sharma SK, Jain G. Effect of different doses of intraumbilical oxytocin on third stage of labor. J South Asian Feder Obst Gynae. 2016;8(4):286-9. https://doi.org/10.5005/jp-journals-10006-1435
21. Jha P, Mishra PK. Comparative study between intra-umbilical vein injection of oxytocin and intramuscular injection of oxytocin in third stage of labour. Int J Pharm Clin Res. 2024;16(2):1058-61. https://impactfactor.org/PDF/IJPCR/16/IJPCR,Vol16,Issue2,Article172.pdf
22. Deshpande HG, Madkar CS, Patel KK. Comparative study between intravenous and intraumbilical oxytocin as active management of third stage in elective and emergency caesarean section. Indian J Obstet Gynecol Res. 2016;3(1):55-8. https://doi.org/10.5958/2394-2754.2016.00011.4
23. Nasreen T, Amir F, Asghar S, Naheed S, Amir S, Aslam R. Effectiveness of intraumbilical oxytocin in retained placenta: a randomized control trial. Rawal Med J. 2024;46(3):640-3. https://www.rmj.org.pk/fulltext/27-1574672286.pdf
24. Ahmed M, Ahmed T, Adel A. Comparative study between intraumbilical oxytocin injection and placental cord drainage in management of third stage of labour. Al-Azhar Int Med J. 2022;3(9):32-7. https://doi.org/10.21608/aimj.2022.127362.1878