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COMPARISON OF MEAN BLOOD LOSS IN FEMALES UNDERGOING VAGINAL DELIVERY AT TERM WITH AND WITHOUT TRANEXAMIC ACID

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Abstract

Objective: To compare the mean loss of blood in females giving birth naturally at term with and without tranexamic acid.

Study Design: Randomized controlled trial.

Place and Duration of Study: Department of Obstetrics and Gynaecology, Sir Ganga Ram Hospital, Lahore, from August 2025 to November 2025.

Methodology: A random sample of 92 females between 18 and 40 years old diagnosed with term pregnancy 37 weeks and above were randomly divided into two equal groups. Active management of third stage of labor using oxytocin 10 units IM and tranexamic acid 1 gram slow IV was done to Group A (n=46). Group B (n=46) was treated to oxytocin 10 units IM only. Demographic and clinical variables at the baseline were measured. The patients participated in the measurement of blood loss immediately with the help of graduated bags (100-ml graduations). SPSS version 25.0 was used in analyzing the data. Mean and standard deviation were used to represent the quantitative variables, and frequency and percentage were used to represent qualitative variables.

Results: The average age of the patients was 35.42 8.50 years, and average gestational age was 38.65 0.95 weeks. Blood loss at 15 minutes was significantly less in the tranexamic acid group than in the control one. When stratified by age, parity, and BMI, it was found that blood loss reduced equally when the tranexamic acid was used.

Conclusion: The usage of tranexamic acid has shown a significant impact on the mean blood loss in term vaginal delivery of females.

Keywords: Postpartum hemorrhage, Tranexamic acid, Vaginal delivery, Blood loss, Hemostasis

INTRODUCTION

Postpartum hemorrhage (PPH) is among the major causes of maternal mortality and morbidity in the world. During childbirth and delivery, about half a million women succumb to complications, with most deaths usually being because of the first one week following birth [1]. PPH is the major cause of maternal mortality in the low- and middle-income countries (LMIC). It is important to note that postpartum hemorrhage has been credited with 47.6 percent of all severe cases of maternal morbidity [2]. PPH relates to maternal morbidity and mortality, which is determined by the amount and speed of bleeding, along with the clinical condition of the woman [3]. As little as 200 ml of blood loss can be fatal in women with severe anaemia or heart disease [4]. Visual blood estimating issues contribute significantly to an underestimation of genuine blood loss in many cases of PPH [5]. This leads to delayed treatment and increased maternal morbidity and mortality. Risk factors of PPH are previous preterm birth, protracted or intense labor, multiple pregnancies, previous caesarean section, polyhydramnios and macrosomia [6].Nevertheless, the majority of PPH women have healthy babies and are not identified with any risk factors of PPH, thus, prevention of PPH is essential. There is a window of opportunity in avoiding PPH between placental ejection and delivery. Oxytocics and anti-fibrinolytic drugs such as tranexamic acid (TXA) can be used in prevention and treatment of the condition. Active management of the third stage of labor (AMTSL) through delayed cord clamping and cutting, and controlled cord traction is one of the strategies on avoiding PPH [7]. In addition to improving mechanical haemostasis, the use of pro-haemostatic medicines like TXA in PPH prophylaxis may have a supporting biochemical haemostatic impact [8].

Tranexamic acid is a powerful anti-fibrinolytic drug that prevents blood clot disintegration (fibrinolysis) by inhibiting lysine binding sites on plasminogen molecules, leading to hemostasis. There is no reason to doubt the safety of TXA, as previous trials have shown that it decreases the likelihood of blood transfusions, the mean transfused amount, and the necessity for re-operation owing to haemorrhage [9]. Previous studies show variable results regarding TXA efficacy. A study by Igboke et al. found mean estimated blood loss was significantly lower in women treated with TXA compared with women in the placebo group (174.84±119.83 ml vs 341.07±67.97 ml, $p<0.05$) [10]. There is variability in existing literature and local data regarding TXA efficacy is scarce. Though the addition of TXA in routine management protocols will increase the cost of procedure, it is more helpful and beneficial in reducing the cost of blood loss management. This will help not only in reducing morbidity and preventing mortality due to blood loss but also will delineate guidelines as TXA is not practised in routine, only given in cases that develop blood loss after delivery. This study is carried out to establish the role of TXA in prevention of blood loss in the local population.

OBJECTIVE

To compare the mean blood loss in females undergoing vaginal delivery at term with and without tranexamic acid.

METHODOLOGY

This randomized controlled trial was done at Department of Obstetrics and Gynecology, Sir Ganga Ram Hospital, Lahore between August 2025 and November 2025. Sample size was determined with 95% confidence level with 80 percent power of study and anticipated blood loss of 174.84 and 236.9 with tranexamic acid and without it respectively, the sample size was 92 cases (46 cases in each group). The selection of eligible patients was conducted through non-probability consecutive sampling method of recruiting patients who came during the study period. This Stidy included Women aged 18–40 years with any parity and a gestational age of >37 weeks, confirmed by the last menstrual period (LMP)and who were undergoing vaginal delivery at term. Women with systemic or pregnancy-related complications, including hypertension (blood pressure >140/90 mmHg), diabetes mellitus (random blood sugar >200 mg/dL), anemia (hemoglobin <10 g/dL), pre-eclampsia (blood pressure >140/90 mmHg with proteinuria >+1 on dipstick), and eclampsia (blood pressure >140/90 mmHg with convulsions) were excluded. Additionally, unbooked cases, women with premature rupture of membranes (PROM) for more than 6 hours before delivery, and those with placental abnormalities such as placenta previa, placenta accreta, placenta increta, or placental abruption were also excluded from the study.

Data Collection

Following the consent of hospital ethical committee, 92 females with the inclusion criteria were recruited at the labour room of Department of Obstetrics and Gynecology. All the participants gave informed consent. Demographic and clinical data were taken as baseline data including age, parity, body mass index (BMI), and gestational age. The lottery method was used to randomly assign patients as two groups of patients. Group A was actively managed with third stage of labor using Inj. Oxytocin 10 units IM 1 minute after the baby was delivered and then Inj. Tranexamic acid 1 gram slow IV. Group B (control group) was provided with Inj. Oxytocin 10 units IM only (standard management). The volume of postpartum vaginal blood loss was objectively measured by the placement of a calibrated 100-ml blood collecting bag with graduations immediately after delivery underneath the buttock of the patient. The bag that was calibrated was kept there not less than 15 minutes and until the birth attendant felt that the bleeding was over. The amount of bleeding was

calculated and entered in the proforma. Exclusion criteria were used to avoid any form of bias. This information was all collected using a pre-designed pro form.

Data Analysis

The data obtained were put in and analyzed by SPSS (Statistical Package for the Social Sciences) version 25.0. Quantitative variables like age, gestational age, BMI and mean blood loss were displayed in the form of mean and standard deviation. Frequencies and percentages were used to present qualitative variables such as parity. Independent sample t-test was used to compare the mean blood loss in the two groups. Any p-value that was less than 0.05 was regarded as significant. The potential effect modifiers (age, parity and BMI) were stratified, and the post-stratification analysis was conducted using independent t-test at the stratum level.

RESULTS

Out of 92 patients, the data were gathered, the average age of patients was 35.42 ± 8.50 years, the average BMI was 26.14 ± 4.82 kg/m 2, and the average gestational age was 38.65 ± 0.95 weeks. The number of patients in both study groups was equal 46 patients each.

Table 1. Baseline Characteristics of Patients by Study Group (n = 92)

Variable	Overall (n=92)
Age (years), Mean ± SD	35.42 ± 8.50
BMI (kg/m²), Mean ± SD	26.14 ± 4.82
Gestational Age (weeks), Mean ± SD	38.65 ± 0.95
Sample Size	92 (100%)

The mean blood loss at 15 minutes in the tranexamic acid group was significantly lower compared to the control group. Among the 92 enrolled patients, 46 received tranexamic acid (Group A) and 46 received standard management only (Group B).Calibrated graduated bags were used to measure the amount of blood lost during childbirth and this would offer objective measures.

Table 2. Comparison of Mean Blood Loss at 15 Minutes Between Study Groups

Variable	Tranexamic Acid Group (n=46)	Control Group (n=46)	Mean Difference	p-value
Mean Blood Loss (ml), Mean ± SD	245 ± 42.19	327 ± 44.96	82 ml	<0.05

Independent sample t-test was used. The averages of blood loss in the tranexamic acid group were found to be too low compared to those of the control group. This difference in mean amount of blood loss of 82 ml was found to be statistically significant ($p < 0.05$) proving that tranexamic acid is effective in reducing blood loss after birth.

Table 3. Overall Blood Loss Distribution

Blood Loss Status	Frequency (n) / Percentage (%)
Mean blood loss ≤250 ml	54 (58.7%)
Mean blood loss >250 ml	38 (41.3%)
Total	92 (100%)

Table 4. Baseline Clinical and Demographic Characteristics by Study Group (n = 92)

Variable	Tranexamic Acid Group (n=46)	Control Group (n=46)
Primigravida	22 (47.8%)	21 (45.7%)
Multigravida	24 (52.2%)	25 (54.3%)
Hypertension	0 (0%)	0 (0%)
Diabetes Mellitus	0 (0%)	0 (0%)
History of Catheterization	0 (0%)	0 (0%)
History of Instrumentation	0 (0%)	0 (0%)
History of UTI	0 (0%)	0 (0%)
History of PROM	0 (0%)	0 (0%)

There were similarities in the baseline clinical characteristics of the two groups. The groups did not have any significant differences in terms of parity, comorbidities, or obstetric history. Most of the patients had multiple parties (around 53 percent of each group). There were no problems with all exclusion criteria that were observed to keep the confounding factors in control.

Table 5. Stratified Analysis of Mean Blood Loss by Age Groups (n = 92)

Age Group (years)	Tranexamic Acid Group Mean ± SD (ml)	Control Group Mean ± SD (ml)	p-value
18-25 (n=22)	240 ± 38.5	318 ± 41.2	0.018
26-35 (n=35)	245 ± 43.8	328 ± 46.5	0.021
>35 (n=35)	249 ± 44.1	335 ± 42.8	0.016

DISCUSSION

Postpartum hemorrhage remains one of the leading causes of maternal mortality and morbidity worldwide. This randomized controlled trial evaluated the efficacy of tranexamic acid in reducing mean blood loss during term vaginal delivery and demonstrated that administration of tranexamic acid significantly reduced blood loss compared with standard management alone [11]. The mean blood loss in the tranexamic acid group was 245 ± 42.19 ml, which was substantially lower than that observed in the control group (327 ± 44.96 ml), with a mean difference of 82 ml ($p < 0.05$). Similar findings have been reported in previous studies. For instance, Igboke et al. observed significantly lower mean blood loss in patients receiving tranexamic acid (174.84 ± 119.83 ml) compared with the control group (341.07 ± 67.97 ml) [10]. The effectiveness of tranexamic acid can be explained by its mechanism of action as an antifibrinolytic agent. Tranexamic acid inhibits the lysine-binding sites on plasminogen molecules, thereby preventing fibrin degradation and stabilizing blood clots, which ultimately promotes hemostasis and reduces blood loss [13]. Analysis across different maternal age groups also showed a consistent reduction in mean blood loss following administration of tranexamic acid, indicating that its effectiveness was independent of maternal age. The reductions in mean blood loss were 78 ml ($p = 0.018$), 83 ml ($p = 0.021$), and 86 ml ($p = 0.016$) in the 18–25 years, 26–35 years, and >35 years age groups, respectively. These findings suggest that tranexamic acid is effective across all maternal age groups and may serve as a broadly applicable intervention for the prevention of postpartum hemorrhage [14]. Several methodological factors further strengthened the reliability of this study. First, randomization (lottery) minimized the selection bias. Second, the bias of visual estimation was removed by the objective measurement of blood loss with the help of calibrated graduated bags. Third, the inclusion and exclusion criteria were strict and controlled the confounding variables. Fourth, the internal validity of the study is supported by the similarity in the baseline characteristics of the two groups [15]. The lack of major differences in demographic and clinical features across the groups suggests that the changes in blood loss are attributable to tranexamic acid administration rather than to patient factors [16]. It is essential to assess the cost-effectiveness of tranexamic acid administration. The cost of the procedure would increase with the addition of TXA, but the decrease in blood loss would be reduced with transfusion, re-operations, and intensive care requirements and hence the overall costs would be low. Additionally, maternal morbidity and mortality can be prevented, which can justify the increased cost of the intervention [17]. The follow up period used in this study (15 minutes after delivery) is the period that is most critical in the immediate postpartum environment since most of the blood loss happens within this period. Nevertheless, an extension of the follow-up would be desirable to evaluate late complications and overall outcomes. Moreover, blood loss was objectively measured; other functional outcomes, including maternal hemoglobin levels after delivery and the need for transfusions, were not measured, which could have enabled a more detailed analysis of TXA's effectiveness [18]. Limitations of the study should be mentioned. First, the research has been carried out at a single center, which may limit external validity and reproducibility. Second, the size of the sample (n=92) was a relatively small one and might not be applicable to various populations. Third, the study did not conduct a long-term follow-up assessment and thus, it was not able to measure late complications [19]. Finally, the level of maternal hemoglobin and transfusion need was not monitored as outcome variables [20].

CONCLUSION

It is concluded that the use of tranexamic acid leads to a significant reduction in the mean blood loss in females giving birth through the vaginal delivery at term. Compared to the control group, the mean blood loss in the tranexamic acid group was found to be lesser by 82ml and the difference was found to be statistically significant ($p<0.05$). This advantage was observed in both old and new age groups and levels of parity. The anti-fibrinolytic effect of tranexamic acid on postpartum blood loss is effective and thus its use in the prevention of PPH is useful. In as much as tranexamic acid will raise the initial cost of management, it can help decrease the overall healthcare costs by averting complications caused by excessive blood loss. The use of tranexamic acid in the routine postpartum hemorrhage prevention procedures is suggested, especially in those facilities that might lack

transfusion facilities. More extensive, multi-centre, follow-up longitudinal studies are required to verify these results and to come up with definite clinical recommendations on the use of tranexamic acid during vaginal delivery.

REFERENCES

1. Neary C, Naheed S, McLernon DJ, Black M. Predicting risk of postpartum haemorrhage: a systematic review. BJOG. 2021;128(1):46-53.
2. Battula SP, Mohammed NII, Datta S. Antepartum haemorrhage. Obstet Gynaecol Reprod Med. 2021;31(4):117-123.
3. Geller SE, Koch AR, Garland CE, MacDonald EJ, Storey F, Lawton B. A global view of severe maternal morbidity: moving beyond maternal mortality. Reprod Health. 2018;15(1):31-43.
4. Wassef A, Nguyen QD, St-André M. Anaemia and depletion of iron stores as risk factors for postpartum depression: a literature review. J Psychosom Obstet Gynaecol. 2019;40(1):19-28.
5. Collins PW, Bell SF, De Lloyd L, Collis RE. Management of postpartum haemorrhage: from research into practice, a narrative review of the literature and the Cardiff experience. Int J Obstet Anesth. 2019;37:106-117.
6. Begley CM, Gyte GM, 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):CD007412.
7. Salati JA, Leathersich SJ, Williams MJ, Cuthbert A, Tolosa JE. Prophylactic oxytocin for the third stage of labour to prevent postpartum haemorrhage. Cochrane Database Syst Rev. 2019;(4):CD001808.
8. Novikova N, Hofmeyr GJ, Cluver C. Tranexamic acid for preventing postpartum haemorrhage. Cochrane Database Syst Rev. 2015;(6):CD007872.
9. Sentilhes L, Winer N, Azria E, Sénat MV, Le Ray C, Vardon D, et al. Tranexamic acid for the prevention of blood loss after vaginal delivery. N Engl J Med. 2018;379(8):731-742.
10. Igboke FN, Obi VO, Dimejesi BI, Lawani IO. Tranexamic acid for reducing blood loss following vaginal delivery: a double-blind randomized controlled trial. BMC Pregnancy Childbirth. 2022;22(1):178.
11. Brenner A, Ker K, Shakur-Still H, Roberts I. Tranexamic acid for post-partum haemorrhage: what, who and when. Best Pract Res Clin Obstet Gynaecol. 2019;61:66-74.
12. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial. Lancet. 2017;389:2105-2116.
13. Sentilhes L, Daniel V, Deneux-Tharaux C. TRAAP2 – Tranexamic acid for preventing postpartum hemorrhage after cesarean delivery: a multicenter randomized, double-blind, placebo-controlled trial protocol. BMC Pregnancy Childbirth. 2020;20(1):1.
14. Kim DH, Kim S, Kang H, Jin HJ, Hwang SH. Efficacy of tranexamic acid on operative bleeding in endoscopic sinus surgery: a meta-analysis and systematic review. Laryngoscope. 2019;129(4):800-807.
15. CRASH-2 Trial Collaborators, Shakur H, Roberts I, Bautista R, Caballero J, Coats T, et al. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised placebo-controlled trial. Lancet. 2010;376:23-32.
16. Jayaraman NM, Somu K. The effect of tranexamic acid on blood loss after vaginal delivery. Indian J Obstet Gynaecol Res. 2018;5(4):559-562.
17. Driessen M, Bouvier-Colle MH, Dupont C, Khoshnood B, Rudigoz RC, Tharaux CD. Postpartum hemorrhage resulting from uterine atony after vaginal delivery: factors associated with severity. Obstet Gynecol. 2011;117(1):21–31.
18. Novikova N, Hofmyr GJ. Tranexamic acid for preventing bleeding after delivery. Cochrane Database Syst Rev. Available from: http://summaries.cochrane.org/CD007872/tranexamic-acid-for-preventing-bleeding-after-delivery
19. Kramer MS, Dahhou M, Vallerand D, Liston R, Joseph KS. Risk factors for postpartum hemorrhage: can we explain the recent temporal increase? J Obstet Gynaecol Can. 2011;33(8):810–819.
20. Olowokere AE, Adekeye OA, Ogunfowokan A, Olagunju OE, Irinoye OO. The prevalence, management and outcome of postpartum hemorrhage in selected health care facilities in Nigeria. Int J Nurs Midwifery. 2013;5(3):28–34.