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EFFICACY OF TRANEXAMIC ACID IN REDUCTION OF BLOOD LOSS IN CESAREAN SECTION PATIENTS IN TERMS OF FALL IN HAEMOGLOBIN

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Abstract

Objective: *"To compare the efficacy of tranexamic acid in patients undergoing cesarean section compared to a control group receiving standard care without tranexamic acid".*

Study design: *Randomized controlled trial*

Place and duration of research: *Gynaecology department, Hilal e Ahmar Hospital Faisalabad from May 2025 till 15 July 2025*

Methodology: *Total 62 females (31 in both groups) were enrolled, who presented with singleton pregnancy at 37- 40 week of gestation for elective caesarian section under spinal anesthesia and were randomized to into two groups. In Group A, females will be given 1000 gram of TXA injection mixed in bolus. In Group B, females will not be given any drug. Efficacy in terms of significant drop and blood loss in hemoglobin was also noted. Both groups were compared regarding percentage of fall in hemoglobin 24 hours after surgery.*

Results: *In TXA group, the mean age of females was 28.97 ± 5.13 years while in standard care group was 31.29 ± 6.26 years. The mean fall in hemoglobin level in TXA group was 0.65 ± 0.34 g/dl and in standard care group was 1.88 ± 0.56 g/dl (p<0.05). The mean blood loss observed during cesarean section in TXA group was 437.06 ± 89.76 ml and in standard care group was 622.74 ± 168.39 ml (p<0.0001). In TXA group, the efficacy was observed in 27 (87.1%) females in TXA group, but in 11 (35.5%) females in standard care group (p<0.0001).*

Conclusion: *It is concluded that TXA is a reliable drug to prevent excessive blood loss during cesarean section and prevent fall in hemoglobin level.*

INTRODUCTION

Obstetrical hemorrhage is a clinical manifestation that can be potentially lethal and can occur during either a vaginal delivery or a cesarean section. Reports indicate that it is responsible for almost half of all deaths related to pregnancy. [1, 2] Therefore, likelihood of obstetrical hemorrhage has increased due to the remarkable rise in the use of caesarean sections, which have become increasingly common in both developing countries and nations with low incomes. Other sources of obstetric bleeding, including as surgical damage during cesarean sections, have been found to contribute more to hemorrhage-related maternal death than uterine atony. The risk factors and care procedures of women who passed away from this cause of bleeding, however, are not well documented.[3, 4] Mortality rate from obstetrical hemorrhage remains high in some countries worldwide, despite the fact that there have been significant improvements in identification and cure of this

condition in recent years. Reducing excessive bleeding during vaginal delivery and caesarean sections is essential to lowering the incidence of serious illness and obstetrical hemorrhage-related deaths. During birth, this can be achieved by applying pressure on the abdomen.[1, 2] To plasmin by blocking conversion of plasminogen, anti-fibrinolytic medication tranexamic acid (TXA) may include the coagulation cascade. Its dependability and efficiency in preventing hemorrhage and attempting to reduce the need for blood transfusions during several planned surgical procedures have been well established.[5]

These are both goals that can be accomplished with its use. It was recently discovered that TXA can lessen the amount of bleeding that occurs during gynecology procedures including hysterectomy and myomectomy, as well as menorrhagia. The administration of TXA during caesarean sections has been the subject of a number of studies, all of which have shown that it is successful.[6-8] For women who had cesarean deliveries, tranexamic acid is an affordable strategy to reduce postpartum hemorrhage. Prophylactic use of tranexamic acid at the time of cesarean delivery has been shown to decrease the calculated blood loss, but the effect on the need for blood transfusions is unclear.[9, 10]

Maternal morbidity and death may result from the significant risk of hemorrhage associated with cesarean sections, a major surgical surgery. Blood loss during a variety of surgical procedures, including cesarean sections, has been demonstrated to be decreased by TXA, an antifibrinolytic medication. Purpose of this research is to ascertain how well the experimental group uses tranexamic acid. As blood transfusions need declines, TXA lower risk of problems associated with transfusions. By lowering demand for transfusions of blood and blood loss. Reduced risk of maternal morbidity and death is one way that TXA might enhance maternal outcomes.

METHODOLOGY

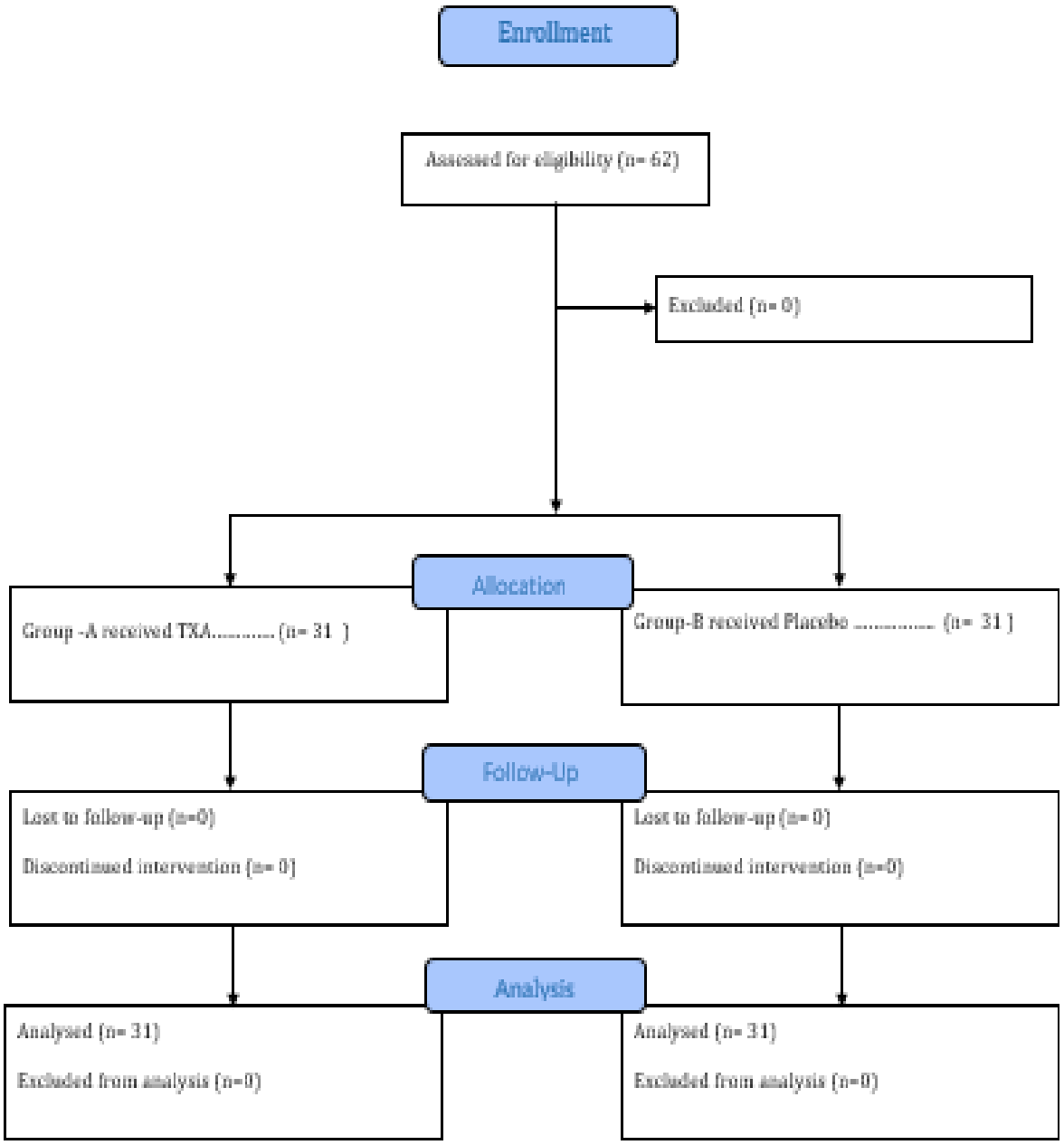
After taking approval from ethical review committee, this randomized regulated trial was carried out at Gynaecology department, Hilal-e-Ahmar Hospital, Faisalabad during period of May 2025 till 15 July 2025 . Sample size was calculated to be 62 cases (31 in both groups) by using WHO sample size calculator at Significance=5%, Power of study = 80%, anticipated frequency fall in Hb in TXA group was 9.3%[11] and in standard care group was 39%.[11] Only the females, who fulfilled following criteria were enrolled by fixing the sampling frame according to mon-probability consecutive sampling technique.

Inclusion criteria: The research comprised women aged 20–40 years, regardless of parity, who presented with a singleton pregnancy at 37–40 weeks gestation (measured from the first day of the most recent menstrual cycle) and were hospitalized for an elective caesarian delivery under spinal anesthesia.

Exclusion criteria: Exclusion criteria for the sample included females with a history of thromboembolic illnesses, a history of abnormal placentation, multiple pregnancies, polyhydramnios, two or more cesarean sections, or blood transfusions for anemia.

Females were randomized to into two groups of equal number of cases. Only the nurse in charge of medicine preparation knew the contents of the A and B packets that the female patients in the operating room were given to choose from. In intervention group, females will be given 1000 gram of TXA injection mixed in bolus. In standard care group, females will not be given any drug. An anesthetist who wasn't in charge of supervising or assessing females injected all of the medicines. Age, gestational age, parity, hemoglobin level at baseline and after 24 hours was noted. Efficacy in terms of significant drop and blood loss in hemoglobin was also noted. Both groups were given spinal anesthesia. Only uterotonics, such as injecting syntocinon to both groups, were utilized for active control of third stage of labor. Regarding percentage of hemoglobin decline 24 hours following surgery, the two groups were contrasted. Females who experienced severe blood loss were treated using all of the typical PPH treatment techniques, such as injecting 10 units of syntocinon. 800 mg of the tablet misoprostol and further surgery if necessary, based on the consultant's judgment.

Figure-1: Patient Flow Diagram (n= 62)



Data was enrolled and analyzed using SPSS version. Mean± SD was calculated for quantitative variables like age, gestation age, HB at baseline and 24 hours blood loss. Qualitative variables like parity and efficacy were analyzed into frequency and percentage. Efficacy was compared using chi-square (χ^2) test by keeping $p \leq 0.05$ as significant.

RESULTS

In this trial, we enrolled total 62 females and randomized them in two homogenous groups of equal number with age, gestational age, and parity matched. In TXA group, the mean age of females was 28.97 ± 5.13 years while in standard care group was 31.29 ± 6.26 years. In TXA group, mean gestational age at time of cesarean section was 38.65 ± 1.14 weeks, while in standard care group was 38.58 ± 1.20 weeks. In TXA group, there were 16 (51.6%) primiparous

and 15 (48.4%) multiparous females. In standard care group, there were 12 (38.7%) primiparous and 19 (61.3%) multiparous females. Table-I

In TXA group, the mean hemoglobin level of at baseline (before starting the surgery) was 10.78 ± 0.34 g/dl that was reduced to 10.13 ± 0.47 g/dl at the end of surgery. Mean fall observed in this group was 0.65 ± 0.34 g/dl (p< 0.05). In standard care group, the mean hemoglobin level of at baseline (before starting the surgery) was 10.88 ± 0.36 g/dl that was reduced to 9.00 ± 0.59 g/dl at the end of surgery. The mean fall observed in this group was 1.88 ± 0.56 g/dl (p< 0.05). Difference in hemoglobin level at baseline was similar in both groups, but at end of surgery fall in hemoglobin level was significantly higher in standard care group than TXA group (p<0.0001). Mean drop in hemoglobin level was also significantly higher in standard care group than TXA group (p< 0.0001). The percentage change in hemoglobin level was 6.07 ± 3.16% with TXA and 17.29 ± 5.13% with standard care and difference was highly significant (p<0.0001). Mean blood loss observed during cesarean section in TXA group was 437.06 ± 89.76 ml and in standard care group was 622.74 ± 168.39 ml. The difference in both groups for intraoperative blood loss was highly significant (p<0.0001). Table-II, Figure-1

In TXA group, the efficacy (blood loss volume of ≤500ml from placental delivery until end of surgery) was observed in 27 (87.1%) females in TXA group, but in 11 (35.5%) females in standard care group. The difference in both groups was highly significant (p< 0.0001). Table-III

Table-I: Basic demographic details of females recruited in the trial (n = 62)

	Trial groups	
	Tranexamic acid group	Standard care group
n	31	31
Age of females, in years	28.97 ± 5.13	31.29 ± 6.26
Gestational age at delivery, in weeks	38.65 ± 1.14	38.58 ± 1.20
Parity		
Primiparous	16 (51.6%)	12 (38.7%)
Multiparous	15 (48.4%)	19 (61.3%)

Table-II: Comparison of intraoperative blood loss and fall in hemoglobin level in females given tranexamic acid or not (n = 62)

	Trial groups		p-value
	Tranexamic acid group	Standard care group	
n	31	31	
Hemoglobin level before surgery, in g/dl	10.78 ± 0.34	10.88 ± 0.36	0.269
Hemoglobin at end of surgery, in g/dl	10.13 ± 0.47	9.00 ± 0.59	<0.0001
Fall in hemoglobin level, in g/dl	0.65 ± 0.34	1.88 ± 0.56	<0.0001
Percentage change in hemoglobin level, %	6.07 ± 3.16	17.29 ± 5.13	<0.0001
Blood loss, in ml	437.06 ± 89.76	622.74 ± 168.39	<0.0001

(Independent samples t-test was applied)

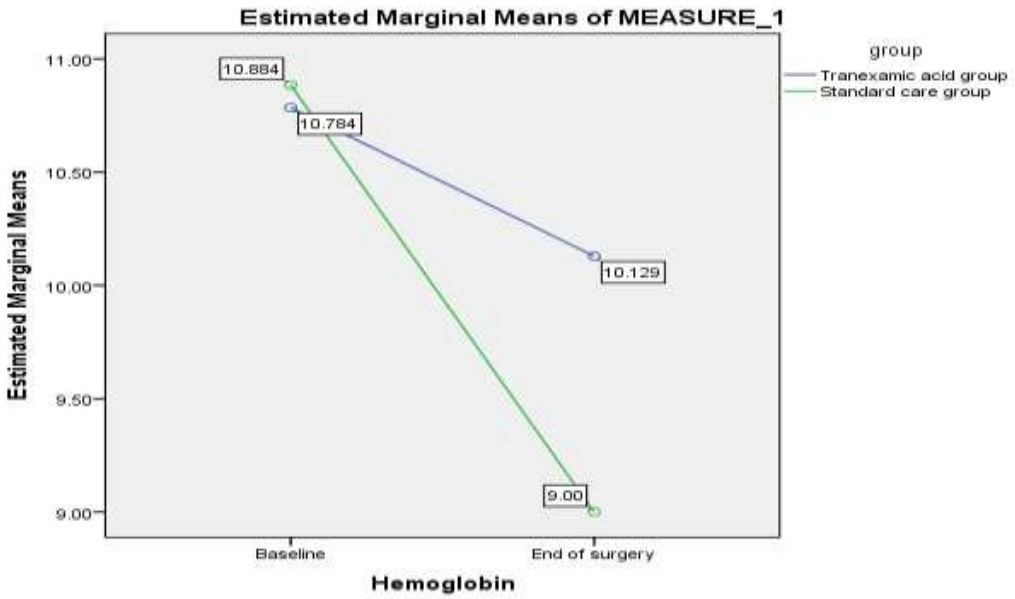


Figure-1: representing change in hemoglobin level intraoperatively in both groups, n = 62, p<0.0001 (Repeated measures ANOVA was applied)

Table-III: Comparing the efficacy of management of intraoperative blood loss with and without tranexamic acid (n = 62)

		Trial groups		Total	p-value
		Tranexamic acid group n = 31	Standard care group n = 31		
Efficacy	Yes	27 (87.1%)	11 (35.5%)	38 (61.3%)	<0.0001
	No	4 (12.9%)	20 (64.5%)	24 (38.7%)	

(chi-square test was applied)

DISCUSSION

With TXA, the mean hemoglobin level of at baseline (before starting the surgery) was 10.78 ± 0.34 g/dl that was reduced to 10.13 ± 0.47 g/dl at the end of surgery. Mean fall observed in this group was 0.65 ± 0.34 g/dl (p< 0.05). Without TXA, mean hemoglobin level of at baseline (before starting the surgery) was 10.88 ± 0.36 g/dl that was reduced to 9.00 ± 0.59 g/dl at the end of surgery. The mean fall observed in this group was 1.88 ± 0.56 g/dl (p< 0.05). Difference in hemoglobin level at baseline was similar in both groups, but at end of surgery fall in hemoglobin level was significantly higher without TXA than with TXA (p<0.0001). The mean fall in hemoglobin level was also notably higher without TXA than with TXA (p< 0.0001). In this trial, we observed that mean loss of blood observed during cesarean process with TXA was 437.06 ± 89.76 ml and without TXA was 622.74 ± 168.39 ml. Mean intraoperative blood loss was significantly more without TXA than TXA (p<0.0001). With TXA injection, the efficacy was observed in 87.1% females with TXA injection, but in 35.5% females without TXA. The difference in both groups was highly significant (p<0.0001).

A cesarean section is the delivery of a fetus, placenta, and membranes through an abdominal and uterine incision. Compared to a typical vaginal birth, a cesarean section may result in greater difficulties. 20% of maternal fatalities worldwide are due to postpartum hemorrhage, one of the most frequent consequences of cesarean sections. The rate of cesarean sections has risen from 23.8% to 50% in the industrialized world, while it is declining to over 10% in poorer nations. In Pakistan, the rate is 25%.[12-14]

According to Laskshmi et al, there was a blood loss >500ml is 3.3% and 60% substantial fall in hemorrhage: 347.17ml + 108.6 in TXA group

versus 517.22ml +150 in control group (p<0.001). About 9.3% of females with TXA and 38.9% females in control group saw a reduction in haemoglobin of more than 10% (p 0.01).[11]

Sentilhes et al., found that postpartum hemorrhage happened in 26.7% of women who received TXA injections and in 31.6% of women who did not (adjusted risk ratio, 0.84; 95% CI, 0.75 to 0.94; P = 0.003) in a study including 4551 women having cesarean sections. Use of extra uterotonic medications, postpartum blood transfusions, and mean blood loss did not significantly differ across groups. They concluded that among women who underwent cesarean delivery and received prophylactic uterotonic agents, tranexamic acid treatment resulted in a significantly lower incidence of calculated estimated blood loss > 1000 ml than placebo, but it did not result in a lower incidence of hemorrhage-related secondary clinical outcomes.[15]

As in the first TRAAP trial and in meta-analyses of randomized trials involving women undergoing cesarean delivery, nausea or vomiting occurred significantly more frequently in the TXA group than in the placebo group. [16-18] As in these previous trials, the incidence of thromboembolic events during the 3 months after delivery did not differ significantly between the groups, but these events were uncommon, and power to detect differences was limited; the point estimate of adjusted risk ratio (aRR: 4.01; 95% CI, 0.85 to 18.92) are consistent with a wide range of plausible differences in the incidence of venous thromboembolic events, ranging from 15% lower to 18.92 times higher. This finding calls for caution, given the recent report of a significant, almost doubled risk of these events associated with TXA in patients with gastrointestinal bleeding.[19]

Ortuanya et al., also carried out a randomized study and found that the TXA substantially increased the mean postoperative hemoglobin (10.39±0.96 against 9.67±0.86 g/dL; p = 0.001) and decreased the mean loss of blood (442.94±200.97 versus 801.28±258.68 mL; p = 0.001). They found that in high-risk pregnant women, prophylactic TXA cure dramatically reduces postpartum loss of blood, increases postpartum hemoglobin, and avoids postpartum hemorrhage after cesarean section. It may be recommended that high-risk women take it regularly during cesarean sections.[20]

Cheema et al., in cesarean births TXA may lower risk of loss of blood, with a bigger effect shown in high-risk cases, according to a systematic evaluation of fifty randomized studies conducted in Pakistan. However, lack of high-quality proof limits drawing any firm conclusions. There was a significant advantage of administering TXA before to skin incision, but not after cord clamping. To support or contradict these findings, more research is required, particularly in the high-risk group and aimed at assessing the timing of TXA administration.[9]

CONCLUSION

It is concluded that TXA is a reliable drug to prevent excessive loss of blood during cesarean and prevent fall in hemoglobin level. Ultimately, reduce risk of need for blood transfusion, which is associated with allergic reactions sometime and increase risk of morbidity and mortality of females. It will also be reduce hospital stay and early discharge of female as well as her neonate from the hospital.

CONFLICT OF INTEREST

None.

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