

**Research Article**

**Efficacy of Topical Tranexamic Acid Application for Dry Socket Prevention**

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**ABSTRACT**

**Objective:** To compare the efficacy of topical tranexamic acid & placebo for prevention of dry socket among patients undergoing tooth extraction.

**Methods:** It was a double blinded randomized controlled trial study conducted at the department of Oral & Maxillofacial at Fatima Memorial Hospital, Lahore Pakistan from March 2016 to November 2016. Total of 100 patients were included and divided into two groups, Group A and Group B. Each group comprised of 50 patients. Group A received Tranexamic Acid soaked gauze whereas Group B received distilled water soaked gauze after tooth extraction. Both Groups were followed up 24 hours after extraction for pain status and clot absence.

**Results:** In group A 24% of the patients experienced moderate pain & 8% experienced severe pain whereas in group B 54% patients experienced moderate pain and only 6% experienced severe pain which was statistically significant ( $P < 0.05$ ). The clot was absent in 28% patients in Group A and 62% in Group B which was statistically significant ( $P < 0.05$ ).

**Conclusion:** The study concluded that topical Tranexamic acid is more effective in dry socket prevention as compared to control.

**Keywords:** Topical tranexamic acid, Dry socket, tooth extraction, efficacy

**INTRODUCTION**

The term “dry socket” was first introduced in literature by Crawford in 1896. (1) It is the commonest postoperative complication after dental extraction and also known as alveolar osteitis (AO). (2, 3) The incidence of dry socket

showed variation in previous literature and reported as 1 to 35% for various teeth. (2, 4-6) It is usually occurs around the site of extraction as severe pain for duration of 24-72 hours post extraction, followed by complete or partial blood

clot loss from alveolar socket & with or without halitosis.(7, 8) The possible causes of the dry socket includes female gender, age, smoking, poor oral hygiene, high surgical trauma, use of oral contraceptives, unexperienced surgeon, systematic disease, physical dislodgement of clot, use of anticoagulants and preoperative infection.(9-11)

Previously different approaches have used for the prevention of AO including antiseptics (chlorhexidine), antibiotics, mouth wash, clot supporting agents such as topical hemostatic agents, poly lactic acid, eugenol containing dressing & low level laser therapy but none of them has given consistent results.(12, 13)

Tranexamic acid exerts its antifibrinolytic effect through the reversible blockade of plasminogen molecules thereby inhibiting the interaction of plasminogen and the heavy chain of fibrin hence preventing clot disintegration.(14)

Antifibrinolytic activity of Tranexamic acid can logically be useful in prevention of alveolar osteitis by inhibiting the clot disintegration. A 4.8% solution has been turned out to be extremely viable in lessening bleeding complications with negligible systemic absorption. (15) The antifibrinolytic agent tranexamic acid had been reputed to prevent AO when applied topically in the extraction socket following exodontias.(16, 17)

Since dry socket is the commonest and extremely painful complication of dental extractions. Effective prevention or reduction in incidence of dry socket will have a considerable impact on post-dental extraction recovery.

### **Objectives of the study**

This study was planned to systematically study role of Tranexamic Acid in prevention of dry socket.

### **MATERIALS & METHODS**

It was a double blinded randomized controlled trial study conducted at the outpatient department of Oral & Maxillofacial surgery of Fatima Memorial Hospital, Lahore Pakistan from March

2016 to November 2016. After approval of ethical review committee, the informed consent was taken from all patients. Total of 100 patients were included using non-probability consecutive sampling technique. Sample size was calculated using online Open-Epi sample size calculator, by taking level of significance as 5% and power of test as 90%, the efficacy of tranexamic acid as 6.7% & control group as 30%, the calculated sample size came out as 50 in each group.(18)Inclusion criteria were patients of either gender between 18-60 years of age reported to department for simple tooth extraction (without raising flap) of mandibular molars and willing for follow up were included in study. Patients allergic to Tranexamic acid assessed on history or patients taking anticoagulants and oral contraceptives or Immunocompromised patients or smokers or patients having active purulent infection around the tooth to be extracted assessed clinically or patients undergoing more than one extraction or patients undergoing traumatic extractions were excluded from the study.

Randomization was done through random number tables in the beginning and patients divided into two groups' i.e. A & B (50 patients in each group). All the patients were treated in exodontia department. Extraction carried out under local anesthesia keeping in view the aseptic measures. Adequate hemostasis was achieved. Postoperative instructions & medication were given both in written & verbal forms. Both the groups were given Paracetamol 1g before the procedure with instructions to take 1g six hourly as needed. Tranexamic acid & distilled water packaged were labelled as either Drug A or Drug B for double blinding (researcher and patient). 50 patients in group A received drug A and 50 patients in group B received drug B as a drug soaked gauze placed at surgical site for 30 minutes after surgery. Drug assignment to the two groups was done by supervisor. All the patients were discharged within one hour after surgery.

Patients were followed for 24 hours post-operatively for dry socket. Presence of moderate

to severe pain (VAS 4-10) and absence of clot was diagnosed as dry socket. Extraction and patient review (Follow up) were done by researcher along with documentation.

All the information were collected on a specially designed proforma. The code for the drugs given to the groups was broken after the completion of the statistical analysis to ensure double blinding and researcher analyzed the result for final conclusion.

All the data was entered into SPSS Version 23 and analyzed. Mean±SD was used for quantitative data like age; while frequency and percentage were calculated for qualitative data like gender & presence of dry socket.

Chi-square test was used to compare incidence of dry socket between Group A and Group B. P-value of less than & equal to 0.05 was taken as significant. Confounding variables like age, gender and educational status of patient were controlled by stratification for outcome variable. Post stratification chi-square test was applied to check the significance (P-value ≤ 0.05).

## RESULTS

The mean age of group A(with Tranexamic Acid) was 34.92 years with female to male ratio 1 :1.2 and the mean age of group B(with Distilled Water) was 34.62 years with female to male ratio 1:1.2 (Table.1).

In group A, 24% experienced moderate pain whereas 8% experienced severe pain. In group B,

54% patients' experienced moderate pain and 6% experienced severe pain with p-value=0.021 that is statistically significant (figure-1).

Considering the clot status it was absent in 28% patients In Group A and 62% in Group B. In Tranexamic acid group clot absence was 14% whereas in distilled water group it was 31% when calculated with respect to total number of patients' i.e. n=100 with p-value being 0.001 that is statistically significant (Table 2).

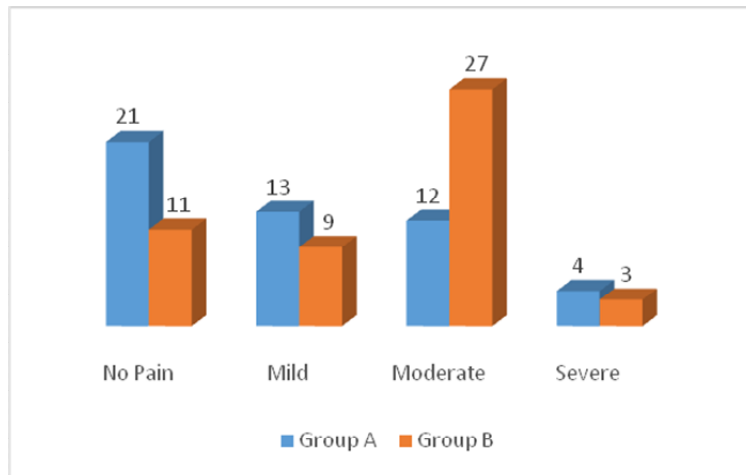
With respect to gender it was found that incidence of dry socket among males in group A was 4 % whereas in group B 15% .Similarly among females in group A it was 9 % whereas in group B 16% with p-values being 0.007 and 0.01 for male and female respectively that are statistically significant.

Incidence of dry socket was 26 % (n=13) in Group A (n=50) whereas in group B (n=50) it was 62 % (n=31) with p-value 0.001 that is statistically significant.

This study reveals favorable effect of tranexamic acid applied topically. Incidence of dry socket with respect to educational status came out to be highest in graduates with p-value 0.057 that is statistically significant. Comparison of dry socket incidence between age categories 18-39 and 40-60 revealed higher incidence of dry socket in group B for those falling in category 18-39 with p-value being 0.005 for age category 18-39 and 0.025 for age category 40-60, both being statistically significant (Table.3)

**Table.1:** Descriptive Statistics of Age & Gender

Variable	Groups	
	Tranexamic Acid	Distilled Water
Age (Mean & SD)	34.92±10.40	34.62±10.63
<b>Gender</b>		
Male	21	26
Female	29	24



**Figure 1:** Severity of pain

**Table 2:** Comparison of clot absence and dry socket between both groups

Drug	Clot Absence		P-value	Dry Socket		P-value
	Yes	No		Yes	No	
Tranexamic Acid	14(28%)	36(72%)	0.021	13 (26%)	37(74%)	0.001
Distilled Water	31(62%)	19(38%)		31(62%)	19(38%)	

**Table 3:** Stratification w.r.t effect modifiers between both groups

Variables		Drug	Dry Socket		Total	P-value
			No	Yes		
Gender	Male	Tranexamic Acid	17	4	21	0.007
		Distilled water	11	15	26	
	Female	Tranexamic Acid	20	9	29	0.01
		Distilled water	8	16	24	
Education	Uneducated	Tranexamic Acid	1	1	2	0.248
		Distilled water	0	2	2	
	Primary	Tranexamic Acid	4	2	6	0.376
		Distilled water	2	3	5	
	Secondary	Tranexamic Acid	15	3	18	0.002
		Distilled water	4	10	14	
	Graduate	Tranexamic Acid	17	7	24	0.057
		Distilled water	13	16	29	
Age Category	18-39 years	Tranexamic Acid	26	9	35	0.005
		Distilled water	12	18	30	
	40-60 years	Tranexamic Acid	11	4	15	0.025
		Distilled water	7	13	20	

**DISCUSSION**

The incidence of dry socket has been reported between 1% and 45% for various teeth in the literature with an incidence that can reach up to 38% on extraction of mandibular molars.(12) In

this study, dry socket (62%) incidence in control group is relatively higher. Dry socket may affect female in ratio of 5:1 with respect to males.(12)According to Sweet & Buttler, the incidence of dry socket is 4% in female while

0.5% in males indicating considerably higher among females.(19)In our study in control group it was 31.25% in males whereas in females it was found to be 30.77%.

Prevention of AO requires control of possible risk factors with attention to procedural details and surgical skills.The initiation of the fibrinolytic process is related to interaction of multiple, interdependent factors, therefore, controlling any single factor addresses only part of the problem. Multiple preventive strategies using number of different antibiotics, antifibrinolytic agents and even plain rinses or basic oral hygiene, before, during and after surgery resulted in variable improvement. It becomes apparent that many different factors are contributing to the problem.(18, 20) Daniel et al investigated the single intra-alveolar application of the bio adhesive 0.2% CHX gel in an intraoperative fashion.The control group had a 17% incidence of AO and the experimental group had a 7% incidence of AO. Bleeding complications occurred in 21% of the experimental group compared with 29% of the control group. This studyconcluded a 11% decrease in the incidence of AO in their experimental group using intra-alveolar bio adhesive 0.2% CHX gel after extraction of retained mandibular third molars compared with 30% in the control group using placebo.(21) Berwick and Lessin found no differences in AO incidence in their 2 study groups one using CHX 0.12% and other cetylpyridinium 0.05%.(22) Delibalsi et al reported similar percentages of AO, among two groups, one using 0.2% CHX mouth rinse and other saline solution.(15) Ragno and Szkutnik found that 0.2% CHX digluconate mouthwash resulted a reduction in AO after the extraction of impacted third molars (17.5% versus 36% in the control group).(23) In another study by Anand KP et al. the incidence of dry socket was found to be

6.66% among the patients administered tranexamic acid both orally and systematically and 30% among those who received no such treatment.(18) In our study, we evaluated that the incidence of dry socket in patients undergoing dental extraction with topical Tranexamic acid application (Tranexamic acid Group) was 26 % whereas with distilled water (Control) incidence was 62% with 42% lesser incidence of AO. In males it was found as 8.33% in group A whereas in group B it was 31.25%.In females it was found to be 17.31% in Group A and 30.77% in Group B.

Appreciable reduction in the incidence of dry socket with topical Tranexamic Acid application was found in current study. Topical Tranexamic Acid application (current study) and 0.2% Chlorhexidine mouthwash are non-invasive and simple to apply solutions. In comparison other interventions used are more cumbersome and expensive. Though this study has been standardized to the maximum possible extent, it is suggested that more studies with larger sample size are warranted to evaluate the efficacy of this tranexamic acid to prevent AO when applied topically in the extraction socket following exodontia.

## CONCLUSION

The incidence of dry socket in patients receiving postoperative topical Tranexamic Acid was 26%. This value is significantly lower than 62% found in patients receiving topical distilled water .The occurrence of dry socket in an everyday oral surgery practice is unavoidable. Treatment options for this condition are directed toward palliative care. However, the results of this study supports the conclusion that the use of Tranexamic Acid applied locally with soaked pressure gauze following the removal of the teeth reduces the incidence of AO associated with the extraction of mandibular molars.

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