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Original Research Article

EFFICACY AND SAFETY OF PRE-INTUBATION ZINC TABLET VERSUS XYLOCAINE SPRAY VERSUS COMBINED THERAPY FOR PREVENTION OF POSTOPERATIVE SORE THROAT IN ADULT SURGICAL PATIENTS UNDER GENERAL ANAESTHESIA

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ABSTRACT

Background: Postoperative sore throat is a frequent complication following endotracheal intubation under general anaesthesia and may cause throat pain, hoarseness, coughing, swallowing difficulty, and reduced postoperative satisfaction. Oral zinc may provide anti-inflammatory and mucosal-protective effects, whereas topical Xylocaine may reduce airway irritation through local anaesthesia. Their combined administration may offer greater protection than either intervention alone. **Aim:** To compare the efficacy and safety of pre-intubation oral zinc 50 mg, 10% Xylocaine spray, and their combination for preventing postoperative sore throat in adult surgical patients undergoing general anaesthesia with endotracheal intubation. **Materials and Methods:** This prospective, randomized, double-blind clinical trial included 90 patients aged 18–60 years with ASA physical status I–III. Participants were allocated equally into three groups of 30 patients each. The zinc group received a dispersible zinc tablet containing 50 mg, the Xylocaine group received 10% Xylocaine spray, and the combined-therapy group received both interventions approximately three minutes before intubation. Demographic, operative, intubation, airway, coughing or bucking, and extubation characteristics were recorded. Postoperative sore throat was graded immediately after extubation and at 30 minutes, 2 hours, 4 hours, and 24 hours. Adverse events were also documented. **Results:** Baseline demographic, operative, and airway characteristics were comparable among the groups. Immediately after extubation, the proportions of patients without sore throat were 56.7%, 40.0%, and 76.7% in the zinc, Xylocaine, and combined groups, respectively (p=0.034). At 30 minutes, Grade 0 symptoms were observed in 40.0%, 30.0%, and 66.7%, respectively (p=0.007). At 2 hours, 96.7% of patients in the combined group were symptom-free compared with 60.0% in the zinc group and 66.7% in the Xylocaine group (p=0.013). At 4 hours, all patients in the Xylocaine and combined groups were symptom-free compared with 90.0% in the zinc group (p=0.045). All patients were symptom-free at 24 hours. Adverse events occurred in 3.3%, 6.7%, and 16.7% of patients, respectively, without a statistically significant difference (p=0.168). **Conclusion:** Combined oral zinc 50 mg and 10% Xylocaine spray provided superior early prevention of postoperative sore throat compared with either intervention alone. The regimen was effective and demonstrated an acceptable short-term safety profile.

INTRODUCTION

Postoperative sore throat (POST) is a common airway-related complication experienced by patients after general anaesthesia involving endotracheal intubation. It may present as throat irritation, pain during swallowing, dryness, cough, hoarseness, or alteration of voice during the early postoperative period. Although POST is usually temporary and does not generally result in serious morbidity, it can adversely affect postoperative comfort, delay oral intake, disturb communication, and reduce overall patient satisfaction with anaesthetic care. The increasing emphasis on enhanced recovery and patient-reported outcomes has therefore made prevention of POST an important component of perioperative airway management.[1] The development of POST is multifactorial and is primarily related to mechanical irritation and inflammation of the pharyngeal, laryngeal, and tracheal mucosa. Direct laryngoscopy can produce local mucosal abrasion, while insertion and movement of the endotracheal tube may cause epithelial injury, oedema, congestion, and inflammatory changes. Pressure exerted by the inflated cuff can impair mucosal perfusion, particularly when the cuff pressure is excessive or remains elevated for a prolonged duration. Other contributing factors include a large endotracheal tube, repeated intubation attempts, traumatic airway manipulation, prolonged anaesthesia, movement of the tube during surgery, aggressive suctioning, coughing or bucking, and difficult or stormy extubation.[2] Patient-related and procedural characteristics may further modify the risk and severity of POST. Age, sex, body mass index, smoking status, pre-existing upper-airway disease, individual pain sensitivity, and anxiety may influence postoperative symptom reporting. Airway-related factors such as the Cormack–Lehane grade, duration of laryngoscopy, number of intubation attempts, presence of blood on the laryngoscope or endotracheal tube, nasogastric tube placement, cuff pressure, and duration of surgery should therefore be considered when evaluating preventive interventions. Standardization of airway techniques and documentation of these variables are necessary to distinguish the pharmacological effect of an intervention from discomfort caused by unequal airway manipulation.[3] Several non-pharmacological and pharmacological strategies have been investigated for the prevention of POST. Non-pharmacological measures include selecting an appropriately sized endotracheal tube, minimizing the number and duration of laryngoscopy attempts, ensuring adequate neuromuscular relaxation, using gentle intubation and suctioning techniques, avoiding unnecessary tube movement, and maintaining cuff pressure within a safe range. Pharmacological approaches include local anaesthetics, corticosteroids, magnesium, ketamine, benzydamine, lubricants, liquorice preparations, and other anti-inflammatory agents. However, differences in drug concentration, formulation, route of administration, timing, and assessment methods have resulted in variability in their clinical effectiveness.[4] Lidocaine, commonly available as Xylocaine, is an amide-type local anaesthetic that acts primarily by blocking voltage-gated sodium channels and preventing the initiation and transmission of nociceptive impulses. When administered as a topical spray before endotracheal intubation, it produces local anaesthesia of the pharyngeal and laryngeal mucosa and may reduce irritation caused by the laryngoscope and endotracheal tube. It may also suppress airway reflexes, thereby limiting coughing, bucking, and haemodynamic responses during intubation and extubation. Nevertheless, the efficacy of lidocaine can vary with its concentration, application site, mucosal contact time, and delivery method. Excessive administration may cause prolonged throat numbness, difficulty swallowing, unpleasant taste, or systemic toxicity, making evaluation of safety essential.[5] Zinc is an essential trace element involved in epithelial integrity, immune function, antioxidant defence, protein synthesis, cellular proliferation, collagen formation, and tissue repair. These properties provide a biological basis for its use in preventing irritation produced by airway instrumentation. Zinc may reduce local inflammatory activity, support mucosal healing, and protect epithelial tissues against oxidative injury. Oral administration in the form of a dispersible tablet or lozenge is simple, inexpensive, and suitable for use shortly before induction of anaesthesia. However, the preventive effect may depend on the elemental zinc dose, formulation, duration of contact with the oral mucosa, and interval between administration and intubation. Potential adverse effects include metallic taste, nausea, abdominal discomfort, vomiting, and local mucosal irritation.[6]

MATERIALS AND METHODS

The investigation was carried out at the Institute of Medical Sciences and SUM Hospital, Bhubaneswar. Adult patients admitted for elective surgical procedures requiring general anaesthesia and endotracheal intubation were recruited during the designated study period. Screening and enrolment were performed in the preoperative area before patients were shifted to the operating room. A hospital-based, prospective, parallel-group, randomized and double-blind clinical trial was undertaken to compare the effectiveness and safety of pre-intubation oral zinc, topical Xylocaine spray, and combined treatment for preventing postoperative sore throat.

The trial consisted of three intervention arms with equal allocation. The protocol was reviewed and approved by the Institutional Ethics Committee of IMS and SUM Hospital, Bhubaneswar, before patient recruitment. Patients received a detailed

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explanation of the study procedures, expected benefits, possible drug-related effects, and their right to discontinue participation.

Written informed consent was obtained before randomization. The allocation sequence was concealed, and postoperative evaluations were conducted by an assessor who had no knowledge of the treatment assignment. Potential participants were identified from the elective operating lists of the hospital. Adult patients aged 18–60 years who were planned for surgery under general anaesthesia with oral endotracheal intubation were assessed during the pre-anaesthetic check-up. Clinical history, airway assessment, ASA physical status, smoking status, allergy history, and previous throat or laryngeal disorders were reviewed before enrolment.

Inclusion Criteria

Patients between 18 to 60 years of age, of either sex, classified as ASA physical status I–III, and scheduled for elective surgery under general anaesthesia with oral endotracheal intubation were eligible. Patients were included only when the expected duration of surgery was three hours or less and written informed consent had been provided.

Exclusion Criteria

Patients were not enrolled when they declined participation, belonged to ASA physical status IV, or had a known allergy or intolerance to zinc or Xylocaine. Patients with recurrent tonsillitis, pharyngitis, laryngitis, pre-existing sore throat, hoarseness, or any diagnosed pharyngeal or laryngeal disease were excluded. Individuals with confirmed or suspected COVID-19 infection, a history of smoking, anticipated difficult airway, or a requirement for nasal intubation were also ineligible.

Operations planned in the prone position, procedures expected to continue for more than three hours, and surgeries in which glycopyrrolate was considered mandatory were excluded. Patients were removed from the study when unexpected difficult intubation occurred or when the original airway or surgical plan was changed after enrolment.

90 patients completed the intervention and postoperative assessment and were included in the analysis. Equal allocation resulted in 30 patients receiving zinc, 30 receiving Xylocaine spray, and 30 receiving combined therapy.

Generation of Random Sequence

A computer-generated random-number schedule was used to assign participants to the three groups in a 1:1:1 proportion. The allocation sequence was prepared independently and transferred into consecutively numbered sealed envelopes. After enrolment, the appropriate envelope was opened by the designated research pharmacist. The anaesthetist performing perioperative management and the investigator conducting postoperative throat assessments were not informed of the group code.

Intervention Protocol

Participants allocated to the zinc group received a dispersible tablet containing 50 mg of zinc. The tablet was dissolved completely in 10 mL of water and administered orally approximately three minutes before endotracheal intubation.

Participants assigned to the Xylocaine group received 10% Xylocaine spray before intubation. One puff was applied to the posterior pharyngeal wall, and another puff was directed towards the glottic region under direct vision immediately before placement of the endotracheal tube.

Participants in the combined-therapy group received both interventions. They were administered a 50 mg dispersible zinc tablet dissolved in 10 mL of water and 10% Xylocaine spray, consisting of one puff to the posterior pharyngeal wall and one puff to the glottic area. Both interventions were completed approximately three minutes before intubation.

Standardization of Anaesthesia and Airway Management

Routine monitoring was applied to all patients before induction of anaesthesia. General anaesthesia was administered according to the standardized departmental protocol. The induction, neuromuscular relaxation, maintenance of anaesthesia, ventilation, and reversal of neuromuscular blockade were performed according to accepted institutional practice.

Oral endotracheal intubation was performed by direct laryngoscopy with an appropriately sized endotracheal tube. The size of the tube, cuff pressure, Cormack–Lehane laryngoscopic view, duration of laryngoscopy, and number of attempts required for successful intubation were entered in the study form. The cuff was inflated sufficiently to provide an adequate seal, and cuff pressure was monitored during the procedure.

Any traumatic event occurring during airway manipulation, including mucosal injury, bleeding, difficult passage of the tube, repeated laryngoscopy, or contact trauma, was documented. Placement of a nasogastric tube and the occurrence of coughing or bucking during maintenance of anaesthesia were also recorded. The total duration of anaesthesia and surgery was measured.

At the conclusion of surgery, extubation was performed carefully after adequate recovery and reversal. Extubation was categorized as smooth when no marked coughing or struggling occurred and as stormy when repeated coughing, bucking, straining, or airway agitation was observed. The removed endotracheal tube was examined for visible blood or evidence of traumatic airway instrumentation.

Assessment of Treatment Efficacy

The efficacy of each intervention was evaluated according to the occurrence of postoperative sore throat after extubation. Patients were interviewed at 4, 8, 12, and 24 hours by a trained investigator who was unaware of the allocated treatment. The same questioning method and grading system were used

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at each assessment to reduce observer-related variation.

Postoperative sore throat was classified into four grades. Grade 0 represented no throat discomfort. Grade 1 indicated mild soreness reported only after direct questioning. Grade 2 denoted moderate soreness reported by the patient without prompting. Grade 3 represented severe throat pain accompanied by hoarseness, altered voice, or considerable discomfort.

The primary efficacy endpoint was the proportion of patients developing postoperative sore throat of any severity during the first 24 hours. The severity of sore throat at each assessment interval and the reduction in moderate-to-severe symptoms were considered additional efficacy outcomes.

Evaluation of Safety: Safety was evaluated from administration of the study intervention until completion of the 24-hour postoperative follow-up. Patients were observed for nausea, vomiting, unpleasant or metallic taste, oral irritation, excessive or prolonged throat numbness, difficulty swallowing, dizziness, local discomfort, rash, swelling, bronchospasm, or any other suspected hypersensitivity reaction. Perioperative haemodynamic or respiratory events occurring after treatment administration were also documented. Any event considered possibly related to zinc or Xylocaine was managed according to standard clinical practice and recorded with its onset, severity, treatment, and outcome.

Outcome Measures: The main outcome measure was the incidence of postoperative sore throat within 24 hours of extubation. Additional outcomes included the severity of sore throat at 4, 8, 12, and 24 hours; the presence of hoarseness or alteration of voice; adverse effects related to zinc or topical Xylocaine; and the association of postoperative symptoms with airway and surgical characteristics.

Clinical and Procedural Variables: Baseline variables included age, sex, body mass index, and ASA physical status. Airway-related variables included endotracheal tube diameter, cuff pressure, Cormack–Lehane grade, duration of laryngoscopy, number of intubation attempts, traumatic injury, nasogastric tube placement, and blood staining of the endotracheal tube. Operative variables included the duration of anaesthesia and surgery, intraoperative coughing or bucking, and the nature of extubation.

Statistical Methods: Statistical processing was carried out with IBM SPSS Statistics version 25.0. Numerical measurements were summarized as mean ± standard deviation, while qualitative variables were reported as numbers and percentages. Comparisons of continuous variables across the zinc, Xylocaine, and combined-treatment groups were conducted using one-way analysis of variance. Differences in categorical outcomes were evaluated with the chi-square test. Statistical significance was defined by a two-tailed P value of less than 0.05.

Ethical Approval

Approval was obtained from the Institutional Ethics Committee of IMS and SUM Hospital, Bhubaneswar. All participants signed written informed consent after receiving adequate information about the trial. Patient safety, privacy, autonomy, and confidentiality were maintained throughout the study. The trial was registered prospectively with the Clinical Trials Registry–India under registration number CTRI/2022/11/047405.

RESULTS

Table 1 summarizes the baseline profile and operative duration of patients allocated to the zinc tablet, Xylocaine spray, and combined-therapy groups. The mean age was 42.43±12.87 years in the zinc tablet group, 35.10±12.60 years in the Xylocaine spray group, and 39.73±14.55 years in the combined-therapy group. This difference was not statistically significant (p=0.105). Male patients accounted for 40.0%, 46.7%, and 33.3% of the three groups, respectively, while the corresponding proportions of female patients were 60.0%, 53.3%, and 66.7%. Gender distribution did not differ significantly among the treatment arms (p=0.574).

The mean BMI was 23.71±2.16 kg/m² in patients receiving zinc, 24.56±3.23 kg/m² in those receiving Xylocaine spray, and 24.49±2.86 kg/m² in patients receiving combined therapy. No significant variation in BMI was found among the groups (p=0.431). ASA physical status I was recorded in 56.7% of the zinc group, 73.3% of the Xylocaine group, and 46.7% of the combined-therapy group. ASA grade II was present in 43.3%, 26.7%, and 50.0% of patients, respectively, whereas ASA grade III was observed in only one patient in the combined group. The ASA distribution was comparable across the three groups (p=0.198). The average duration of surgery was 103.00±26.61 minutes in the zinc group, 109.33±31.59 minutes in the Xylocaine group, and 96.50±31.10 minutes in the combined group, with no statistically significant difference (p=0.255).

Table 2 presents the intubation and airway-related findings. The mean duration of laryngoscopy was 23.97±6.68 in the zinc tablet group, 22.40±6.54 in the Xylocaine spray group, and 23.73±8.06 in the combined-therapy group. The groups were similar with respect to laryngoscopy duration (p=0.935). The reported mean endotracheal tube diameter was 7.60±0.36, 7.57±0.50, and 25.57±0.33 in the respective groups, and the difference was not significant (p=0.819). Mean cuff pressure was also comparable, measuring 26.23±3.97 in the zinc group, 25.87±4.13 in the Xylocaine group, and 25.57±4.15 in the combined group (p=0.657).

Nasogastric tube insertion was required in 9 (30.0%) patients receiving zinc and in 13 (43.3%) patients each in the Xylocaine and combined-treatment groups. The difference was not statistically significant (p=0.473). Intubation was completed on

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the first attempt in 25 (83.3%), 26 (86.7%), and 24 (80.0%) patients, respectively. Two attempts were required in 4 (13.3%) patients in each of the zinc and Xylocaine groups and in 6 (20.0%) patients in the combined group. Only one patient in the zinc group required three attempts. Overall, the number of attempts was similar among the three groups (p=0.618).

The distribution of Cormack–Lehane grades was also comparable (p=0.706). Grade I was observed in 30.0% of patients receiving zinc, 46.7% receiving Xylocaine spray, and 36.7% receiving combined therapy. Grade II was recorded in 46.7%, 43.3%, and 43.3%, respectively. Grade IIIA was found in 16.7% of the zinc group, 10.0% of the Xylocaine group, and 16.7% of the combined group, while Grade IIIB occurred in 6.7%, 0.0%, and 3.3% of patients, respectively.

Table 3 shows peri-extubation airway responses. Coughing or bucking was noted in 5 (16.7%) patients in the zinc tablet group, 6 (20.0%) patients in the Xylocaine spray group, and 4 (13.3%) patients in the combined-therapy group. This variation was not statistically significant (p=0.787). Smooth extubation occurred in 25 (83.3%) patients receiving zinc, 28 (93.3%) receiving Xylocaine spray, and all 30 (100.0%) patients receiving combined treatment. Stormy extubation was seen in 5 (16.7%) patients in the zinc group and 2 (6.7%) patients in the Xylocaine group, while no such event was observed in the combined group. Although the combined-therapy group had the highest proportion of smooth extubation, the difference did not attain statistical significance (p=0.065).

Table 4 evaluates the efficacy of the three interventions in preventing postoperative sore throat. Immediately after extubation, absence of sore throat, represented by Grade 0, was reported in 17 (56.7%) patients in the zinc group, 12 (40.0%) patients in the Xylocaine group, and 23 (76.7%) patients in the combined group. Grade 1 symptoms occurred in 30.0%, 46.7%, and 23.3% of patients, respectively, whereas Grade 2 symptoms were present in 13.3% of both the zinc and Xylocaine groups and were absent in the combined group. The difference among the three treatments was statistically significant (p=0.034).

At 30 minutes after extubation, Grade 0 was observed in 40.0% of patients receiving zinc, 30.0% receiving Xylocaine spray, and 66.7% receiving combined therapy. Grade 1 symptoms were found in 43.3%, 40.0%, and 33.3%, respectively. Grade 2 sore throat was reported in 16.7% of the zinc group and 30.0% of the Xylocaine group, while no patient in the combined group developed Grade 2 symptoms. The intergroup difference was statistically significant (p=0.007), showing better early postoperative throat comfort with combined therapy.

At two hours, 18 (60.0%) patients in the zinc group, 20 (66.7%) patients in the Xylocaine group, and 29 (96.7%) patients in the combined group had no sore throat. Grade 1 symptoms persisted in 30.0%, 23.3%, and 3.3% of patients, respectively. Grade 2 symptoms were present in 10.0% of both single-treatment groups but were not observed in the combined-treatment group. The difference remained statistically significant (p=0.013).

At four hours, Grade 0 was found in 27 (90.0%) patients receiving zinc and in all 30 (100.0%) patients in both the Xylocaine and combined-treatment groups. Mild Grade 1 symptoms remained in 3 (10.0%) patients in the zinc group, while no patient in either of the other groups reported sore throat. No Grade 2 symptoms were recorded in any treatment group. This difference was statistically significant (p=0.045). At 24 hours, all patients in the three groups were free from postoperative sore throat, with every participant classified as Grade 0. Since there was no variation among the groups, a p-value was not applicable.

Table 5 compares treatment-related adverse events and provides the safety findings of the study. Side effects were reported in 1 (3.3%) patient receiving zinc, 2 (6.7%) patients receiving Xylocaine spray, and 5 (16.7%) patients receiving combined therapy. No side effects were reported in 29 (96.7%), 28 (93.3%), and 25 (83.3%) patients, respectively. Although adverse events occurred more frequently in the combined-therapy group, the difference among the three groups was not statistically significant (p=0.168).

Table 1: Baseline Profile and Operative Duration of Patients Receiving Zinc Tablet, Xylocaine Spray, or Combined Therapy

Patient characteristics	Zinc Tablet	Xylocaine Spray	Combined Therapy	p-value
Age in completed years	42.43±12.87	35.10±12.60	39.73±14.55	0.105
Gender				
Male	12 (40.0%)	14 (46.7%)	10 (33.3%)	0.574
Female	18 (60.0%)	16 (53.3%)	20 (66.7%)	
BMI	23.71±2.16	24.56±3.23	24.49±2.86	0.431
ASA grading				
I	17 (56.7%)	22 (73.3%)	14 (46.7%)	0.198
II	13 (43.3%)	8 (26.7%)	15 (50.0%)	
III	0 (0.0%)	0 (0.0%)	1 (3.3%)	
Duration of surgery (in min)	103.00±26.61	109.33±31.59	96.50±31.10	0.255

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Table 2: Intubation and Airway-Related Characteristics in the Three Treatment Groups

Airway variables	Zinc Tablet	Xylocaine Spray	Combined Therapy	p-value
Duration of laryngoscopy	23.97±6.68	22.40±6.54	23.73±8.06	0.935
Diameter of ET tube	7.60±0.36	7.57±0.50	25.57±0.33	0.819
Cuff pressure	26.23±3.97	25.87±4.13	25.57±4.15	0.657
Nasogastric tube insertion				
Yes	9 (30.0%)	13 (43.3%)	13 (43.3%)	0.473
No	21 (70.0%)	17 (56.7%)	17 (56.7%)	
Number of attempts				
1	25 (83.3%)	26 (86.7%)	24 (80.0%)	0.618
2	4 (13.3%)	4 (13.3%)	6 (20.0%)	
3	1 (3.3%)	0 (0.0%)	0 (0.0%)	
CL grading				
I	9 (30.0%)	14 (46.7%)	11 (36.7%)	0.706
II	14 (46.7%)	13 (43.3%)	13 (43.3%)	
IIIA	5 (16.7%)	3 (10.0%)	5 (16.7%)	
IIIB	2 (6.7%)	0 (0.0%)	1 (3.3%)	

Table 3: Distribution of Coughing, Bucking, and Extubation Pattern Among the Treatment Groups

Peri-extubation variables	Zinc Tablet	Xylocaine Spray	Combined Therapy	p-value
Coughing/bucking				
Yes	5 (16.7%)	6 (20.0%)	4 (13.3%)	0.787
No	25 (83.3%)	24 (80.0%)	26 (66.7%)	
Extubation				
Smooth	25 (83.3%)	28 (93.3%)	30 (100.0%)	0.065
Stormy	5 (16.7%)	2 (6.7%)	0 (0.0%)	

Table 4: Postoperative Sore Throat Severity Following Zinc Tablet, Xylocaine Spray, and Combined Therapy

Post-extubation assessment	Zinc Tablet	Xylocaine Spray	Combined Therapy	p-value
Immediately after extubation				
Grade 0	17 (56.7%)	12 (40.0%)	23 (76.7%)	0.034
Grade 1	9 (30.0%)	14 (46.7%)	7 (23.3%)	
Grade 2	4 (13.3%)	4 (13.3%)	0 (0.0%)	
After 30 minutes				
Grade 0	12 (40.0%)	9 (30.0%)	20 (66.7%)	0.007
Grade 1	13 (43.3%)	12 (40.0%)	10 (33.3%)	
Grade 2	5 (16.7%)	9 (30.0%)	0 (0.0%)	
After 2 hours				
Grade 0	18 (60.0%)	20 (66.7%)	29 (96.7%)	0.013
Grade 1	9 (30.0%)	7 (23.3%)	1 (3.3%)	
Grade 2	3 (10.0%)	3 (10.0%)	0 (0.0%)	
After 4 hours				
Grade 0	27 (90.0%)	30 (100.0%)	30 (100.0%)	0.045
Grade 1	3 (10.0%)	0 (0.0%)	0 (0.0%)	
Grade 2	0 (0.0%)	0 (0.0%)	0 (0.0%)	
After 24 hours				
Grade 0	30 (100.0%)	30 (100.0%)	30 (100.0%)	–
Grade 1	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Grade 2	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 5: Safety Comparison of Zinc Tablet, Xylocaine Spray, and Combined Therapy

Adverse events	Zinc Tablet	Xylocaine Spray	Combined Therapy	p-value
Side effects				
Yes	1 (3.3%)	2 (6.7%)	5 (16.7%)	0.168
No	29 (96.7%)	28 (93.3%)	25 (83.3%)	

DISCUSSION

The baseline characteristics of the three treatment groups were statistically comparable, supporting an unbiased evaluation of the interventions. The mean ages were 42.43±12.87 years in the zinc-tablet group, 35.10±12.60 years in the Xylocaine-spray group, and 39.73±14.55 years in the combined-therapy group (p=0.105). Similarly, there were no significant differences in gender distribution (p=0.574), BMI (p=0.431), or ASA physical status (p=0.198). The mean durations of surgery were also comparable at 103.00±26.61, 109.33±31.59, and 96.50±31.10 minutes, respectively (p=0.255). Çatalca et al. (2025), in a randomized controlled trial involving 136 patients, likewise demonstrated comparable demographic characteristics between patients intubated with cooled and operating-room-temperature endotracheal tubes. Their median ages were 48.5 and 48 years (p=0.742), female patients constituted 71.2% and 71.4% (p=0.978), and ASA grades I and II were distributed as 51.5% and 48.4% in one group and 41.4% and 58.5% in the other (p=0.238). The demographic balance in the present investigation therefore strengthens the interpretation that subsequent differences in postoperative sore

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throat were related primarily to the assigned prophylactic interventions rather than baseline differences.[7] Intubation-related characteristics were also similar among the three groups. The mean duration of laryngoscopy was 23.97±6.68 in the zinc group, 22.40±6.54 in the Xylocaine group, and 23.73±8.06 in the combined group (p=0.935). The reported mean endotracheal tube diameters were 7.60±0.36, 7.57±0.50, and 25.57±0.33, respectively (p=0.819), while the corresponding cuff pressures were 26.23±3.97, 25.87±4.13, and 25.57±4.15 (p=0.657). These findings indicate that the groups were statistically comparable regarding factors capable of producing mechanical mucosal injury. Hu et al. (2013) analysed three trials involving 509 female patients and found that using a 6.0-mm endotracheal tube rather than a 7.0-mm tube significantly reduced postoperative sore throat in the post-anaesthesia care unit, with a relative risk of 0.56 (95% CI: 0.42–0.75; p<0.01). A smaller tube also reduced sore throat at 24 hours, with a relative risk of 0.69 (95% CI: 0.48–0.99; p<0.05). Their findings demonstrate the importance of controlling tube size when evaluating preventive agents. In the present study, the absence of a statistically significant difference in tube diameter, cuff pressure, or laryngoscopy duration reduces the likelihood that these procedural factors independently explained the differences in postoperative throat symptoms.[8] Nasogastric tube placement and the technical difficulty of intubation were similarly distributed. Nasogastric tubes were inserted in 30.0% of patients receiving zinc and 43.3% of patients in each of the Xylocaine and combined-therapy groups (p=0.473). First-attempt intubation was achieved in 83.3%, 86.7%, and 80.0% of patients, respectively, while the overall number of attempts did not differ significantly (p=0.618). Cormack–Lehane grading was also comparable among the groups (p=0.706); grades IIIA or IIIB occurred in 23.4% of the zinc group, 10.0% of the Xylocaine group, and 20.0% of the combination group. Jaensson et al. (2014) prospectively evaluated 495 patients, including 203 men and 292 women, and reported postoperative sore throat in 35% and postoperative hoarseness in 59% of the study population. Among women managed with an endotracheal tube, repeated laryngoscopy was identified as a risk factor for postoperative sore throat. Their observations support the clinical importance of limiting airway manipulation and repeated instrumentation. Since most patients in the present trial were successfully intubated on the first attempt and the distributions of intubation attempts and laryngoscopic grades were similar, airway difficulty was unlikely to have materially biased the comparative efficacy of zinc, Xylocaine spray, and their combination.[9] Coughing or bucking occurred in 16.7% of patients in the zinc group, 20.0% in the Xylocaine group, and 13.3% in the combined-therapy group, with no significant difference among the groups (p=0.787). Smooth extubation was achieved in 83.3%, 93.3%, and 100.0% of patients, respectively. Although every patient receiving combined therapy had a smooth extubation, this difference did not reach statistical significance (p=0.065). Navarro et al. (2012) studied 50 smokers undergoing general anaesthesia and compared intracuff alkalinized 2% lidocaine with saline. Emergence coughing occurred in 80% of patients receiving saline but in only 28% of those receiving lidocaine (p<0.001). Postoperative sore throat in the recovery unit was reported in 20% of the saline group and none of the lidocaine group (p=0.02), whereas the corresponding incidences at 24 hours were 12% and 0%, respectively (p=0.07). The lower frequency of coughing and complete absence of stormy extubation in the combined-therapy group of the present study are consistent with the airway-reflex-suppressing action of lidocaine. However, the lack of statistical significance suggests that a larger sample may be required to confirm whether combined therapy meaningfully improves the quality of extubation.[10] The principal efficacy findings showed that combined therapy provided the greatest early protection against postoperative sore throat. Immediately after extubation, postoperative sore throat of any grade was present in 43.3% of patients receiving zinc, 60.0% receiving Xylocaine spray, and 23.3% receiving combined therapy (p=0.034). At 30 minutes, the corresponding incidences were 60.0%, 70.0%, and 33.3% (p=0.007). Moderate Grade 2 sore throat immediately after extubation occurred in 13.3% of both single-treatment groups but in none of the patients receiving combined treatment. At 30 minutes, Grade 2 symptoms were recorded in 16.7% of the zinc group, 30.0% of the Xylocaine group, and 0% of the combined group. Ketata et al. (2024) randomized 90 patients into placebo, intracuff alkalinized-lidocaine, and intravenous-lidocaine groups. At six hours, postoperative sore throat was observed in 67%, 30%, and 47% of patients, respectively. At 24 hours, the respective incidences were 67%, 13%, and 37%. Their results confirm the preventive efficacy of lidocaine, particularly when delivered through a route that provides sustained contact with the tracheal mucosa. In the present trial, the lower incidence and absence of moderate symptoms with combined therapy suggest that oral zinc may complement the immediate local anaesthetic effect of Xylocaine.[11] The protective effect of combined treatment remained evident during subsequent postoperative assessments. At two hours, postoperative sore throat was present in 40.0% of the zinc group, 33.3% of the Xylocaine group, and only 3.3% of the combined group (p=0.013). Grade 2 symptoms occurred in 10.0% of both single-intervention groups but were absent after combined treatment. At four hours, sore throat persisted in 10.0% of patients receiving zinc but was absent in both the Xylocaine and combination groups (p=0.045). By 24 hours, all 90 patients were

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symptom-free. Mondal et al. (2023) randomized 132 patients to magnesium sulphate gargle, zinc sulphate gargle containing 40 mg elemental zinc, or 5% dextrose. During the first 24 hours, the highest recorded incidence of postoperative sore throat was 25% in the magnesium group compared with 13.6% in the zinc group, while the lowest incidence was 13.6% with magnesium and 0% with zinc. Mild postoperative sore throat was significantly less frequent with zinc during the first four hours ($p<0.05$). These findings support the early protective effect of zinc observed in the present study. Nevertheless, the particularly low two-hour incidence of 3.3% with combined therapy suggests that zinc and Xylocaine may provide complementary mucosal and analgesic effects.[12] Safety analysis showed that side effects occurred in 1 (3.3%) patient receiving zinc, 2 (6.7%) patients receiving Xylocaine spray, and 5 (16.7%) patients receiving combined therapy. No adverse events were reported in 96.7%, 93.3%, and 83.3% of patients, respectively. Although the numerical frequency was highest with combined treatment, the difference was not statistically significant ($p=0.168$). Banihashem et al. (2015) randomized 90 female patients into 10% lidocaine-spray, beclomethasone-spray, and saline-control groups, with 30 patients in each group. They found significantly lower incidence and severity of postoperative sore throat and cough with lidocaine than with saline and reported no local or systemic adverse effects attributable to the study sprays. Their safety findings support the general tolerability of topical lidocaine when used in an appropriate dose. In the present study, the absence of a statistically significant difference in adverse events indicates that all three regimens had an acceptable short-term safety profile. However, because side effects were numerically more frequent with combined therapy, larger studies should specifically evaluate the type, severity, and duration of adverse reactions. Overall, the combined regimen offered the strongest early efficacy, while its safety remained statistically comparable to the individual treatments.[13]

CONCLUSION

Pre-intubation combined therapy with oral zinc 50 mg and 10% Xylocaine spray was more effective than either treatment alone in preventing early postoperative sore throat. The combination group showed the lowest incidence and severity of symptoms and the highest rate of smooth extubation. Adverse events were uncommon, and the difference among the groups was not statistically significant. These findings suggest that combined therapy is an effective and acceptably safe preventive approach for adult patients undergoing endotracheal intubation under general anaesthesia.

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