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ORIGINAL ARTICLE

# Comparison of small versus large size endotracheal tube use with and without intravenous lignocaine on the occurrence of postoperative sore throat in women undergoing elective thyroid surgery at Tertiary Care Hospital, Karachi.

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**ABSTRACT… Objective:** To compare small and large size endotracheal tube utilization with and without intravenous lignocaine on the occurrence of postoperative sore throat among women who have undergone elective thyroid surgery in Tertiary Care hospital, Karachi. **Study Design:** Randomized Control Trail. **Setting:** Department of Anesthesia, Civil Hospital, Karachi. **Period:** Six Months from 09-11-21 till 09-05-22. **Methods:** In this research, 204 patients in an elective thyroid surgery were utilized. Such patients were randomized in four groups, 51 in group A (ETT size 7.0 with saline); 51 in group B (ETT size 6.0 with saline); 51 in group C (ETT size 7.0 with lidocaine ad 51 in group D (ETT size 6.0 with lidocaine). Quantitative and qualitative data were gathered and displayed and examined. Post stratification chi square test was used with p-value of 0.05 as significant. **Results:** The mean age of the patients was 40.22+5.19 years. Group D showed a significantly lower rate of POST than Group A (23.53% vs.58.82%, P=0.0005), B (23.53% vs. 39.22%, P = 0.088) and C (23.53% vs. 43.14%, P = 0.036). **Conclusion:** The use of lignocaine with small size endotracheal tubes resulted in fewer episode of postoperative sore throat.

**Key words:** Endotracheal Tube Use, Lignocaine and Postoperative Sore Throat.

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## INTRODUCTION

Even with the modern anaesthetic techniques, endotracheal intubation causes postoperative sore throat (POST) which is considered a persistent issue to anaesthesiologists. The latest data defines POST as the second most widespread minor adverse event that occurs during the post-anaesthesia recovery phase.[1] Incidences of POST on general anaesthesia report a wide range of 20 to 74 per cent.[2] POST is a multifactorial development, where patient-related issues (age, sex, and smoking status) and intubation-related issues (intubation technique, intubation duration, endotracheal tube (ETT) caliber, airway clearance, and intracuff pressure) are involved.[3] Sore throat is a type of postoperative pain that commonly causes the need to take more analgesics. Mucosal damage can occur as a result of coughing or bucking during emergence, and the friction between the tracheal mucosa and the endotracheal tube during general anaesthesia.[4,5]

Some of the measures suggested to minimize the occurrence and severity of airway discomfort post operation include licorice gargles, inhaled fluticasone propionate, aspirin and benzydamine hydrochloride gargles, lidocaine spray, intracuff alkalinized lidocaine, magnesium lozenges, stellate ganglion block, dexamethasone and lidocaine administration.[6,7] Even though a significant number of these interventions have proven to be effective, they are frequently not implemented in clinical practices due to limited availability, patient cooperation, and general inconvenience.[8,9] However, endotracheal intubation has become an inevitable part of airway control during the general anaesthesia.[10]

It has been indicated that the rate and frequency of POST can be greatly reduced by using endotracheal tubes with small diameter, especially in female patients.[11]

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Postoperative intubation has been reported to increase the likelihood of females developing POST almost twice as much as males.[12] Moreover, intravenous lidocaine before intubation or post suggestion has been revealed to reduce the prevalence of postoperative sore throat and cough.[13,14] Xu et al. presented a randomized controlled trial which evaluated how the size of ETT and intravenous lidocaine influence POST. They found highest POST incidence after six hours of extubation in all groups of the study: Group A (ETT size 7.0 saline), Group B (ETT size 6.0 saline), Group C (ETT size 7.0 lidocaine), and Group D (ETT size 6.0 lidocaine). It is also important to note that, Group D had a much lower incidence of POST at six hours post-extubation in comparison with Group A (23 vs. 62, $P < 0.01$), Group B (23 vs. 42, $P = 0.03$), and Group C (23 vs. 43, $P = 0.03$).[15]

As far as we know, none of the studies done in Pakistan have compared the success of a sore throat after the operation with smaller or bigger endotracheal tubes, presence or absence of intravenous lidocaine in women undergoing elective thyroid surgery. In addition, our local evidence does not yet exist on determining the superiority of any of the preventive strategies in our clinical setting. Such a gap in the literature gives a convincing rationale to the need to conduct the current study. It is believed that the findings will yield modern, locally-oriented information on POST, and thus some evidence-based local practice guidelines will be developed. The end result is that it could aid in decreasing patient suffering, related morbidities and post-operative complications.

## METHODS

It was a randomized controlled trial that was conducted in the Department of Anesthesia, Civil Hospital, Karachi, during six months, between 9 November 2021 and 9 May 2022. An equal number of 204 patients were used and divided into four study groups with each group having 51 participants. The estimation of the sample size was done with the help of WHO sample size calculation program by assuming 90 percent power, 95 percent level of confidence and an expected prevalence of postoperative sore throat as 23 percent in Group D and 42 percent in Group B according to the past literature.[15] Non-probability consecutive sampling method was used to recruit the patients.

These were female patients aged 30 to 60 years of physical status as I or II according to the American Society of Anesthesiologists (ASA), who were scheduled to undergo elective thyroid surgery. The patients were excluded when they refused to consent, needed multiple efforts to intubate them, had a sore throat or upper respiratory tract infection in the last month, or had a recent surgery on the maxillofacial, intraoral, or neck. Other exclusion criteria were smoking, allergic to lignocaine, use of analgesics or corticosteroid within 24 hours of surgery, pregnancy, and comorbid conditions such as asthma, chronic obstructive pulmonary disease, congestive heart failure, chronic liver or kidney disease, or previous stroke.

The study was commenced with the College of Physicians and Surgeons Pakistan and institutional ethics review committee giving their ethical approval (CPSP/REU/ANS-2019-183-2069). All the participants gave their informed consent in writing. The baseline demographic and anthropometric data, such as age, residence, height, weight, and body mass index (BMI) were taken at the time of admission.

The process of randomization was conducted with the help of sealed opaque envelopes that were used to assign patients to either four groups. Group A was given endotracheal tube (ETT) size 7.0 combined with intravenous saline, Group B was given endotracheal tube (ETT) size 6.0 combined with intravenous saline, Group C was given endotracheal tube (ETT) size 7.0 combined with intravenous lignocaine and Group D was given endotracheal tube (ETT) size 6.0 combined with intravenous lignocaine. Groups C and D patients were exposed to the intravenous lignocaine (1.5 mg/kg diluted in 10 mL) and Groups A and B to the same volume of normal saline. Premedication was done to all patients with pantoprazole 40 mg and ondansetron 8 mg.

General anesthesia was caused with the help of fentanyl 2 µg/kg and propofol 2 mg/kg. To influence neuromuscular blockade, atracurium 0.5 mg/kg

was used to achieve neuromuscular blockage and intubation of the trachea, which was conducted by an anesthetist with over ten years of clinical practice. The use of ondasetron 4mg in prophylaxis of postoperative nausea and vomiting was used during skin closure.

Paracetamol 1 g intravenously every eight hours was used as a postoperative analgesic, and tramadol was used as an as-needed analgesic intravenously 50mg. In the assessment of postoperative sore throat, the primary researcher made the assessment with the assistance of a senior anesthesiologist. Those patients who presented with sore throat were treated with saline nebulization after every six hours and one dose of diclofenac sodium 75 mg intramuscularly. Quantitative variables, including age, height, weight, BMI, and surgery duration, and qualitative variables, including living status, ASA status, obesity, the use of smokeless tobacco, and the presence of a sore throat after the surgery were measured.

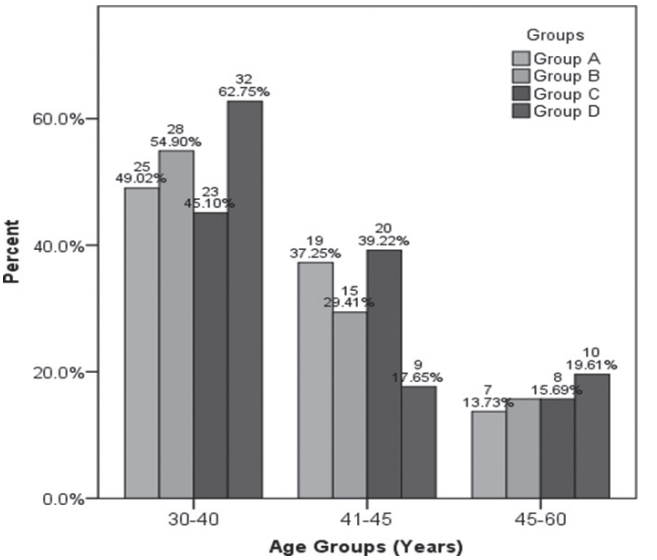
The statistical analysis has been done using SPSS version 20. The continuous variables were given in mean and standard deviation and the categorical one in frequencies and percentages. The chi-square test was used to test the occurrence of postoperative sore throat across the four groups. The stratification was done with the effect modifiers that were age, residence, ASA status, obesity, tobacco use, and duration of surgery, and the chi-square analysis was done later on after the stratification. A p-value of 0.05 and below was said to be statistically significant.

## RESULTS

A total of 204 patients undergoing elective thyroid surgery were included in this study. These patients were randomly allocated into four groups, 51 in group A (ETT size 7.0 with saline); 51 in group B (ETT size 6.0 with saline); 51 in group C (ETT size 7.0 with lidocaine ad 51 in group D (ETT size 6.0 with lidocaine). Age distribution of the patients according to group is presented in Figure-1.

**FIGURE-1**

**Age distribution of the patients with respect to groups (n= 204)**

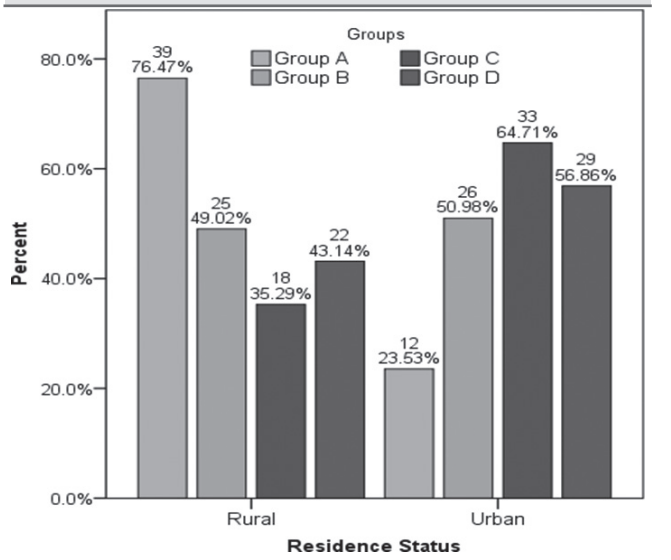



The average age of the patients was 40.22±5.19 years. Mean age, weight, height, BMI and duration of surgery of the patients according to group is shown in Table-I. There were 51% patients from rural and 49% from urban.

Residence status of the patients is shown in Figure-2.

**FIGURE-2**

**Residence status distribution (n=204)**




Regarding ASA status, 49% were ASA-I cases and 51% were ASA-II cases. Out of 204 patients, 58(28.4%) had used tobacco. ASA status and

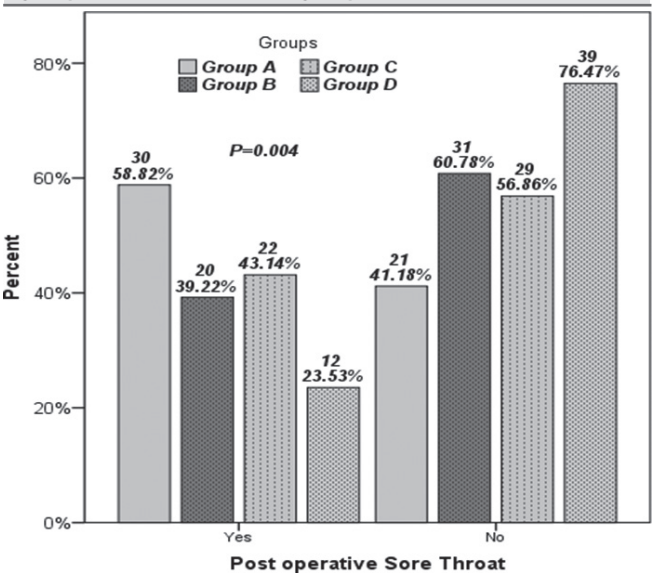
tobacco status according to groups is reported in Table-II.

Out of 204, 87(42.6%) were obese. Most of them were in group A and D as shown in Table-III.

Rate of postoperative sore throat was significantly low in group B. The incidence of POST was significantly lower in Group D compared with Groups A (23.53% vs.58.82%, P=0.0005), and C (23.53% vs. 43.14%, P = 0.036) however it was not statistically significant with B (23.53% vs. 39.22%, P = 0.088) at 6h after extubation as shown in Figure-4.

**FIGURE-3**

**Comparison of rate of postoperative sore throat among the groups n=204 (51 in each group)**




Stratification analysis was performed and control the effect of confounder like age, residence status, ASA-status, duration of surgery, Obesity and tobacco used status but incidence was low in group D as compare to all groups as shown in Table-IV.

## DISCUSSION

The endotracheal intubation process still forms part of the majority of general anaesthetic procedures practiced in the present day anaesthetic practice. Postoperative sore throat (POST) is an established minor complication of general anaesthesia and is usually cited by patients among the most unpleasant postoperative events. Even though POST generally is self-limiting and does not demand any special treatment, preventive measures to ensure that the occurrence rate and severity is decreased is significant to improve the overall quality of post-anaesthesia care. One of the non-pharmacological methods used has been the application of smaller diameter endotracheal tubes, owing to the fact that smaller diameter endotracheal tubes are said to cause less airways trauma during intubation, hence reducing the risks of POST.

In the current study, 102 participants were recruited and assigned to two major groups including 51 and 51 participants respectively according to the stated inclusion and exclusion criteria. The age of the participants in Group A was between 36 and 60 years.

**TABLE-I**

**Demographic characteristics of patients according to groups**

| Variables | Group A n=51 | | Group B n=51 | | Group C n=51 | | Group D n=51 | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Age (Years) | 40.71 | 4.01 | 39.59 | 5.59 | 40.90 | 4.25 | 39.53 | 6.13 |
| Height (m) | 1.57 | .06 | 1.59 | .05 | 1.59 | .06 | 1.59 | .06 |
| Weight (kg) | 71.63 | 12.44 | 73.02 | 7.57 | 72.55 | 11.39 | 79.39 | 13.63 |
| BMI (kg/$m^2$) | 28.93 | 4.73 | 28.81 | 2.70 | 28.64 | 3.52 | 31.24 | 5.16 |
| Duration of surgery (minutes) | 110.27 | 58.98 | 107.00 | 57.43 | 129.29 | 67.66 | 127.05 | 67.42 |

**TABLE-II**

**Asa status distribution according to groups (n=204)**

| ASA Status | Group A n=51 | Group B n=51 | Group C n=51 | Group D n=51 |
|---|---|---|---|---|
| ASA I | 25(49%) | 23(45.1%) | 27(52.9%) | 25(49%) |
| ASA II | 26(51%) | 28(54.9%) | 24(47.1%) | 26(51%) |

**TABLE-III**

**Obesity status according to groups (n=204)**

| Obesity Status | Group A n=51 | Group B n=51 | Group C n=51 | Group D n=51 |
|---|---|---|---|---|
| Obese | 21(41.2%) | 14(27.5%) | 18(35.3%) | 34(66.7%) |
| Non-Obese | 30(58.8%) | 37(72.5%) | 33(64.7%) | 17(33.3%) |

**TABLE -IV**

**Comparison of postoperative sore throat among the groups stratified by different variables (n=204)**

| Stratification Variable | Category | Sore Throat | Group A | Group B | Group C | Group D | P-Value |
|---|---|---|---|---|---|---|---|
| **Age Groups** | 30–40 | Yes | 14 (56.0%) | 10 (35.7%) | 8 (34.8%) | 6 (18.8%) | 0.036 |
| | | No | 11 (44.0%) | 18 (64.3%) | 15 (65.2%) | 26 (81.3%) | |
| | 41–45 | Yes | 13 (68.4%) | 7 (46.7%) | 9 (45.0%) | 2 (22.2%) | 0.132 |
| | | No | 6 (31.6%) | 8 (53.3%) | 11 (55.0%) | 7 (77.8%) | |
| | 45–60 | Yes | 3 (42.9%) | 3 (37.5%) | 5 (62.5%) | 4 (40.0%) | 0.004 |
| | | No | 4 (57.1%) | 5 (62.5%) | 3 (37.5%) | 6 (60.0%) | |
| **Residence** | Rural | Yes | 19 (48.7%) | 9 (36.0%) | 10 (55.6%) | 5 (22.7%) | 0.121 |
| | | No | 20 (51.3%) | 16 (64.0%) | 8 (44.4%) | 17 (77.3%) | |
| | Urban | Yes | 11 (91.7%) | 11 (42.3%) | 12 (36.4%) | 7 (24.1%) | 0.001 |
| | | No | 1 (8.3%) | 15 (57.7%) | 21 (63.6%) | 22 (75.9%) | |
| **ASA Status** | ASA-I | Yes | 14 (56.0%) | 8 (34.8%) | 8 (29.6%) | 4 (16.0%) | 0.026 |
| | | No | 11 (44.0%) | 15 (65.2%) | 19 (70.4%) | 21 (84.0%) | |
| | ASA-II | Yes | 16 (61.5%) | 12 (42.9%) | 14 (58.3%) | 8 (30.8%) | 0.097 |
| | | No | 10 (38.5%) | 16 (57.1%) | 10 (41.7%) | 18 (69.2%) | |
| **Duration of Surgery** | ≤ 120 min | Yes | 18 (52.9%) | 10 (26.3%) | 14 (53.8%) | 6 (20.0%) | 0.006 |
| | | No | 16 (47.1%) | 28 (73.7%) | 12 (46.2%) | 24 (80.0%) | |
| | > 120 min | Yes | 12 (70.6%) | 10 (76.9%) | 8 (32.0%) | 6 (28.6%) | 0.004 |
| | | No | 5 (29.4%) | 3 (23.1%) | 17 (68.0%) | 15 (71.4%) | |
| **Obesity** | Yes | Yes | 11 (52.4%) | 5 (35.7%) | 10 (55.6%) | 5 (14.7%) | 0.007 |
| | | No | 10 (47.6%) | 9 (64.3%) | 8 (44.4%) | 29 (85.3%) | |
| | No | Yes | 19 (63.3%) | 15 (40.5%) | 12 (36.4%) | 7 (41.2%) | 0.141 |
| | | No | 11 (36.7%) | 22 (59.5%) | 21 (63.6%) | 10 (58.8%) | |
| **Smokeless Tobacco Use** | Yes | Yes | 12 (75.0%) | 8 (57.1%) | 4 (30.8%) | 4 (26.7%) | 0.024 |
| | | No | 4 (25.0%) | 6 (42.9%) | 9 (69.2%) | 11 (73.3%) | |
| | No | Yes | 18 (51.4%) | 12 (32.4%) | 18 (47.4%) | 8 (22.2%) | 0.039 |
| | | No | 17 (48.6%) | 25 (67.6%) | 20 (52.6%) | 28 (77.8%) | |

The means of age, height, weight, body mass index (BMI), and duration of surgery were 48.78 ± 7.91 years, 158.16 + 15.70 cm, 69.12 + 10.21 kg, 28.36 + 3.71 kg/m 2 and 2.35 + 1.55 hours respectively. Likewise, Group B had the patients of the ages 36-60. The average age, height, weight, BMI, and operative time in this group were 61.45 ± 8.01 years, 152.90 ± 14.17 cm, 72.01 ± 11.14 kg, 29.71 ± 2.35 kg/m 2 and 2.89 ± 1.69 hours respectively.

The preoperative and postoperative sore throat were compared through a p-value of 0.20 whereby, in Group A, 22 patients (43.1) and in Group B, 30 patients (58.8) had a sore throat after surgery. On

the contrary, POST was found in 11 patients (21.6) in Group C and 17 patients (33.3) in Group D and the p-value was 0.19. On the whole, frequencies and the severity of POST differed significantly between the four groups, and the difference in the total incidence was significant ($p < 0.001$). Also, there was a large difference in POST incidence at 1, 6 and 24 hours after extubation ($p = 0.001$, $p < 0.001$ and $p = 0.002$, respectively). The intergroup comparison had statistically significant differences in POST incidence and severity between Groups A and C, Groups B and D, and Groups A and D.[16]

The POST was highest at six hours of extubation across all the study groups. At this time, Group D had significantly lower incidence of POST than that of Group A (23% vs. 62%, $P < 0.01$), Group B (23% vs. 42%, $P = 0.03$), and Group C (23% vs. 43% $P = 0.02$). These results also indicate that the beneficial outcome of the smaller endotracheal tube size in conjunction with intravenous lignocaine to reduce postoperative airway discomfort.[17]

These findings are also supported by the evidence provided on a pooled analysis of three randomized controlled trials on 509 females who compared the endotracheal tube sizes of 6.0 mm and 7.0 mm. The synthesised findings indicated that endotracheal tube of a smaller size had a significant impact on the incidence of POST in the post-anaesthesia care unit (PACU) (RR = 0.56, 95% CI 0.42–0.75, $P < 0.01$) and at 24 hours after surgery (RR = 0.69, 95% CI 0.480.99, $P = 0.05$). Also, the PACU had lower postoperative hoarseness with the smaller tube size (RR = 0.69, 95% CI 0.551.15, $P < 0.01$), but found no significant difference at 24 hours after operation (RR = 0.73, 95% CI 0.461.15, $P > 0.05$).[18]

## CONCLUSION

The results of this research point to the fact that postoperative sore throat is considerably lower and milder with the application of a smaller-sized endotracheal tube. Furthermore, the smaller endotracheal tube combined with intravenous lignocaine seems to be more effective in reducing POST symptoms than any of the two interventions.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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| AUTHORSHIP AND CONTRIBUTION DECLARATION | |
|---|---|
| 1 | **Hira Rauf:** Study design. |
| 2 | **Maria Hashmi:** Interpreted data. |
| 3 | **Hajra Zafar Siddiqui:** Data collection. |
| 4 | **Hubba Ahmed:** Draft writing. |
| 5 | **Muhammad Moazzam Ali:** Critical revisions. |
| 6 | **Umama Masnoon:** Proof reading. |