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Effects of Rosemary Extract on Sore Throat after Intratracheal Intubation; A Double-Blind Clinical Trial

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Abstract

Introduction: Postintubation sore throat is an inflammatory reaction following intratracheal intubation, which causes anxiety and stress for patients. Given the anti-inflammatory effects of rosemary extract, this substance seems to be able to prevent postintubation sore throat. Methodology: The present double-blind clinical trial was performed on 70 patients who were assigned to intervention and control groups based on the randomly permuted quadruple blocks. A sterile gauze impregnated with rosemary extract (for the intervention group) and a sterile gauze impregnated with normal saline (for the control group) was put at the patients' pharynx. The status of postoperative sore throat was measured by the Visual Analogue Scale (VAS) and the data were statistically analyzed using chi-square and Fisher's exact test at the significance level of 0.05. Results: The prevalence of sore throat in the intervention group (treated with rosemary extract) and the control group was 48.57±4.55 and 54.28±4.91, respectively. This indicated no significant difference between the two groups (p=0.6). In addition, there was no significant difference between the two groups after anesthesia. Discussion and Conclusion: Rosemary extract has been reported to be beneficial in most studies due to its anti-inflammatory compounds. However, administering this extract to the patients' pharynx after intubation had no reducing effect on sore throat as a common postintubation complication.

Key words: Intubation, Sore Throat, Rosemary.

Introduction

Intratracheal intubation is an appropriate method for inducing anesthesia to patients undergoing a surgery. However, it is considered one of the most dangerous procedures by medical students, anesthesiologists, and other members of the medical staff because of its several perioperative and postoperative complications (Aghamohammadi, Gol and Farzin, 2018; Aghamohammadi et al., 2018; Goljabini et al., 2018). Sore throat is a common unpleasant complication (21-65%) of intratracheal intubation (Sultan et al., 2011; Ahmed et al., 2007). Several factors are involved in the occurrence of this complication including the large size of the tracheal tube, age over 60 years, pharyngeal packs, excessive pressure on the tracheal tube cuff, long time of surgery, and patient's status during surgery (Anil Gupta, 2012).

Although sore throat is a mild post-anesthesia complication that is recovered within 72 hours, and about half of the patients with sore throat and hoarseness improve within 24 hours after extubation. However, pain is so severe in some patients that they require medical measures (El-Boghdadly, Bailey and Wiles, 2016; Kuriyama, Maeda and Sun, 2018). Hence, most anesthesiologists take medicinal and non-medicinal measures in order to minimize inflammation in the tracheal region (El-Boghdadly, Bailey and Wiles, 2016; Thomson et al., 2017). Some of these methods include lidocaine sprays, dexamethasone injection, beclomethasone inhalation, and benzydamine hydrochloride spray as medicinal treatments and the use of small tracheal tubes, intubation after complete muscle relaxation, precision in patient's pharynx suction technique, and extubation when the cuff is completely empty as non-medicinal methods. The main objective of all mentioned measures is to reduce or minimize inflammation in the tracheal region in order to prevent postintubation sore throat (Tanaka et al., 2015; Lam et al., 2015; Hu et al., 2013; Zhao, Cao and Li, 2015; Chen et al., 2014).

Rosemary is an available substance whose anti-inflammatory properties has been reported in many studies. Carnosol and ursolic acid are

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two substances of the rosemary extract with antioxidant effects which can improve joint inflammation caused by oxidative agents in the body. *In vitro* experiments indicated that rosmarinic acid can improve the carrageenan-induced inflammation in the rat's foot. It has been also shown that apigenin has anti-inflammatory and healing properties. Ursolic acid also has anti-inflammatory properties, and these two compounds in rosemary oil apply great anti-inflammatory effects (Rocha et al., 2015; Ngo, Lau and Chua, 2018). The research hypothesis is that anti-inflammatory effects of rosemary extract can reduce sore throat caused by inflammation of intratracheal intubation. Hence, the present research aimed to study the effects of rosemary on postintubation sore throat.

Methodology

The present study was a double-blind clinical trial conducted in Imam Reza Hospital affiliated with Tabriz University of Medical Sciences in 2018. After approval of the research project in the Ethics Committee and registration on Iranian Registry of Clinical Trials (IRCT20180806040724N1), the researcher visited the studied center and briefed patients on the research objectives and procedure and then proceeded to sampling. Accordingly, 70 patients who met the inclusion criteria filled out an informed consent form and entered the study. Then, they were assigned to intervention and control groups (35 patients apiece) based on randomly permuted quadruple blocks and using www.randomization.org.

The inclusion criteria were patients aged 20-60 years undergoing a general surgery, patients with ASA I-II, surgeries requiring intratracheal intubation in a supine position. In addition, the exclusion criteria included taking anti-inflammatory drugs within two weeks before the surgery, history of upper airways infection and sore throat, difficult intubation, prolonged operation for more than 3 hours, sensitivity to rosemary, addiction, psychopathy, and emergency patients.

IV lines with the catheter no. 20 were connected to patients half an hour before entering the operating room and 500 mL normal saline was administered to them in 30 minutes. Then, patients entered the operating room under monitoring (pulse oximeter, peripheral blood pressure, and ECG). Patients were prepared for anesthesia with 1 µg/kg of fentanyl and 0.02 mg/kg of midazolam. In addition, anesthesia was induced using 1-2.5 mg/kg of propofol, 0.5 mg/kg of atracurium, and 1-1.5 mg/kg of lidocaine. Three minutes later, after making sure that the patient's muscles are completely loose, they were calmly intubated by an anesthesiologist using a cuffed oral tracheal tube with a diameter of 7-8 mm.

After intubation, a sterile gauze impregnated with the desired substance was put at patient's pharynx using forceps. Sterile gauzes for the intervention group were impregnated with 3 mL rosemary syrup (*R. officinalis*) (containing rosemary extract) provided from Fadak Pharmaceutical Company and sterile gauzes for the control group were impregnated with 3 mL of normal saline. The surgeon, the anesthesiologist, and the patient were not aware of the substance type. Anesthesia was continued using propofol and remifentanil. Vital signs of all patients were kept in the normal range and changes in vital signs more than 10% resulted in excluding the patient from the study.

After the surgery, muscle relaxation was recovered using neostigmine (0.05 mg/kg) and atropine (0.04 mg/kg). In addition, the sterile gauze and the tracheal tube were removed after suctioning the secretions inside the mouth and patients were transferred to the recovery unit. After recovery of the patients, the sore throat status was measured in the recovery unit and 2, 6, and 24 hours after recovery by a medical student who was unaware of experimental grouping using the VAS. To relieve pain on the surgery site, the same analgesic regimen (muscular 50 mg pethidine) was performed for all patients. In the case of severe sore throat that required medication, 4 mg of dexamethasone was administered to patients.

The obtained data were statistically analyzed by descriptive tests (frequency, percentage, mean, and standard deviation), independent *t*-test, RMA, chi-square, and Fisher's exact test in SPSS-25 at the significance level of 0.05. The normality of data distribution was assessed using the Kolmogorov-Smirnov test and Q-Q plot.

Results

A total of 70 patients participated in this study, 40 of whom were male and 30 were female. More precisely, there were 20 males and 15 females in the intervention group and 21 males and 14 females in the control group. The results showed that there was no significant difference between the two groups in terms of gender (p=0.81). The mean duration of general anesthesia for surgery was 110.45±26.45 minutes and the mean age of patients was equal to 42.70±14.05 years. Detailed information for each group is given in Table 1.

The prevalence of sore throat in the intervention group (treated with rosemary extract) and the control group was 48.57±4.55 and 54.28±4.91, respectively. This indicated no significant difference between the two groups (p=0.6). In addition, the number of sore throat cases suggested no significant difference between the recovery time and 2, 6, and 24 hours after the recovery. The mean and standard deviation of the number of patients with post-anesthesia sore throat are shown in Table 2.

The mean severity of sore throat in the intervention and control groups was 1.77±0.97 and 1.91±0.85, respectively. These figures indicated no significant between the two groups (p=0.88). In addition, the pain severity exhibited no significant difference between the recovery time and 2, 6, and 24 hours after the recovery. The results related to sore throat severity at different times in the intervention and control groups are shown in Table 3.

Since severe sore throat was observed in none of the patients, dexamethasone was injected to none of them.

Discussion

The present research aimed to study the effects of rosemary extract on the reduction of postintubation sore throat. The results indicated that there was no significant difference between patients treated with rosemary extract and normal saline in terms of the severity of sore throat, although it was lower at different hours after intubation in the intervention group. Sore throat is one of the most common post-anesthesia complications that is recovered within 72 hours and about half of the patients with sore throat and hoarseness improve within 24 hours after extubation. This complication is still a common problem after general anesthesia and there are many ways to treat and prevent it (J H., 2010). Most drugs used in this regard focus on the reduction of inflammation in the trachea. Anti-inflammatory effects of rosemary have been proven in many studies (Rocha et al., 2015; Arranz et al., 2015; Rahbardar et al., 2018). Considering the anti-inflammatory effects of this herbal substance, it can be effective in relieving postintubation sore throat.

In a study by Joao Rocha *et al*., positive anti-inflammatory effects of rosemary were investigated and confirmed. They also predicted that the anti-inflammatory properties of this plant can be effective in inflammatory injuries. The results of the present study, unlike the findings of Joao Rocha *et al*., could not show the beneficial effects of rosemary in reducing inflammation (Rocha et al., 2015). Ghasemzadeh and Osakabe also reported the positive effects of rosemary extract in reducing pain and inflammation of patients (Rahbardar et al., 2017; Osakabe et al., 2004).

The antioxidant effects of two substances of rosemary extract, called carnosol and ursolic acid, show that these two substances improve inflammatory complications of the joints caused by oxidative agents in the body. Since the consumption method and amount of this extract cause different responses, the best practice should be found in different interventions (Nasab, Rahnema and Mezraii, 2017).

Ghafarzadegan *et al*. studied the effects of an ointment containing several herbs such as rosemary on the back pain and inflammation in patients undergoing a coronary angiogram and reported that the addition of several herbs, all of which has analgesic and anti-inflammatory effects, can produce the best effects. The negligible effect of rosemary extract in the present study seems to be associated with its separate consumption (Ghafarzadegan et al., 2018). Razmjoue *et al*. stated that oral administration of medicinal herbs in several days is the best way to achieve the optimal result (Razmjoue, Zarei and Armand, 2018). Authors of the present research believe that the administration of rosemary extract through mouth and throat in 3-4 hours leads to the minimum absorption of this substance.

The lack of precise knowledge of the concentration of rosemary extract in syrups was one of the limitations and weaknesses of the present study. Therefore, it is recommended to conduct more studies on oral administration or gargling of rosemary extract in order to find the most suitable method for the use of this anti-inflammatory plant.

Conclusion

Rosemary extract has been reported to be beneficial in most studies due to its anti-inflammatory compounds. However, administering this extract to the patients' pharynx after intubation had no reducing effect on sore throat as a common postintubation complication.

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Table 1: The mean and standard deviation age and duration of general anesthesia in the intervention and control group

Variable	Intervention group	Control group	*p*-value
Age	42.08±13	43.31±12.53	p=0.8
Duration of general anesthesia (min)	107.28±23.81	113.71±27.15	p =0.34

Table 2. The mean and standard deviation of the number of patients with post-anesthesia sore throat

Time	Control group	Intervention group	*p*-value
At the recovery	12±0.48	11±0.47	p=0.61
2 hours after recovery	15±0.50	15±0.50	p=1
6 hours after recovery	16±0.50	13±0.4497	p=0.19
24 hours after recovery	14±0.49	12±0.48	p=0.34

Table 3: Severity of sore throat at different times in two experimental groups

Time	Control group	Intervention group	*p*-value
At the recovery	2.11±0.55	2.11±0.55	p=1
2 hours after recovery	1.73±1.05	1.55±0.94	p=0.57
6 hours after recovery	1.73±1.25	2.2±1.25	p=0.86
24 hours after recovery	1.67±0.97	1.46±0.57	p=0.86