The Efficacy of Licorice Gargle for Attenuating Postoperative Sore Throat

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Abstract

Background: Postoperative sore throat (POST) is a common complication in patients undergoing endotracheal intubation and it contributes to patient dissatisfaction. The licorice has been used in the treatment of lung diseases, such as dry cough, hoarseness and sore throat. **Aim:** The study was conducted to evaluate the efficacy of licorice gargle for attenuating POST. **Method:** The study was conducted in the surgical units, operating, and recovery rooms at King Fahd University Hospital in Al-Khobar and consisted of sixty patients who fulfilled the inclusion criteria were randomized into two groups of 30 each. The control group: followed the routine hospital care; The experimental group: gargled with 0.5 g licorice in water for 30 s, just 5 min before induction of anesthesia. The incidence and severity of POST at rest and on swallowing were assessed at 0, 2, 4, and 24 hours postoperatively. Severity of POST was assessed through Numerical Rating Scale (between 0 and 10). Data were analyzed by using SPSS. ($P < 0.05$) was considered as significant. **Results:** POST (incidence and severity) was reduced in the experimental group compared with the control group at rest and on swallowing for all time points ($P< 0.05$), except that the incidence of POST at rest, in 4 hour and 24 hours, on swallowing, in 24 hours and the severity of POST at rest, at 24 h, was similar in both groups ($P > 0.05$). **Conclusion:** Licorice gargle performed for 30 seconds, just 5 minutes before anesthesia was effective in attenuating the POST.

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Introduction

Endotracheal intubation is often necessary to achieve airway control during general anaesthesia and to prevent aspiration. However, postoperative sore throat and hoarseness are sources of discomfort for the patient and can result in an unpleasant memory of anaesthesia. [1, 2]

Postoperative sore throat is a common complication in patients undergoing endotracheal intubation with an incidence varies from 40% to 100%, which makes avoiding postoperative sore throat is a major priority for these patients because it contributes to patient dissatisfaction. Many factors are potentially associated with postoperative sore throat, including patient characteristics, methods and materials of endotracheal intubation. (3, 4, 5)

Over the years the anesthesiologists have used many methods in order to reduce postoperative sore throat that includes non-pharmacological and pharmacological trials with variable success. Among the non-pharmacological methods, using smaller-sized endotracheal tubes, using lubricates, careful airway instrumentation, intubation after full relaxation, gentle oropharyngeal suctioning, minimizing intracuff pressure and extubation when the tracheal tube cuff is fully deflated have been reported to decrease the incidence of postoperative sore throat. The pharmacological methods that have been used to reduce postoperative sore throat include the use of beclomethasone inhalation, gargling with one of these medicines: azulenesulphonate, ketamine, aspirin or benzydamine hydrochloride or even herbal remedies which has been recognized useful to humans as medicinal agents. (3, 4, 6, 7, 8, 9)

In most developing countries the use of medicinal plants have been observed as a normative basis for maintenance of good health , 80% of the world population relies on herbal medicines as over the counter herbal formulation and proprietary herbal drugs; therefore, industrialized societies are involved in extraction of bioactive constituents from medicinal plants and use them directly or indirectly as new drugs such as Licorice. Licorice grows in subtropical climates in Europe, the Middle East and Western Asia. It is derived from the root of Glycyrhizaglabra, which belong to the leguminosae family. Also, it is known as sweet roots that contain compound which is roughly 50 times sweeter than sugar. Therefore, it is used as a sugar substitute in food (10, 11, 12, 13).

Modern science has proved that the claims for the effectiveness of licorice extracts are credible. Hence, it is widely used in pharmaceutical and confectionery industries because of the presence of Glycyrhizin and other active ingredients. It is known for its anti-inflammatory and anti-allergic effects. These actions are due to the effect of glycyrrhizin on the adrenal gland, which is responsible for producing cortisol, the body's own anti-inflammatory adrenal steroid hormone. It also has adaptogenic properties by stimulating cortisol production and inhibiting the deactivation of glucocorticoid in the liver when there is not enough, and promoting the breakdown of cortisol when there is too much. Consequently, the licorice has been used in gastrointestinal ulcer treatment, chronic viral diseases, such as hepatitis B and C, dental hygiene, antimicrobial action, anti-tumor action and lung diseases, such as dry cough, hoarseness, sore throat, bronchitis and asthma (14, 15).

Nurses who work on surgical units in hospitals usually provide care to the hospitalized patients including managing their surgical incision site and sore throat pain. The nurse can reduce the sore throat pain by instructing the patient's to gargle with warm saline and avoid cold fluids until the symptoms subside (16).

According to the functions of the licorice that previously have been mentioned, the researcher hypothesized that licorice gargle before surgical operation will decrease the incidence and the severity of postoperative sore throat.

Aim of the Study

The aim of this study is to evaluate the efficacy of licorice gargle for attenuating postoperative sore throat.

Research Methodology

I. Research Design: An experimental design was used in carrying out this study.
II. Research Setting: The present study was conducted in the surgical wards, operating room and post-anaesthesia care unit at King Fahd University Hospital in Al Khobar City, Kingdom of Saudi Arabia.
III. Research Sample: The population of this study consisted of 60 patients who were admitted to the above mentioned settings and met the inclusion criteria.
Inclusion criteria:

- Patients' ages are between18 and 60 years-old.
- Gender: male and female.
- ASA (American Society of Anesthesiologists) physical status I and II [17].
- Patients undergoing elective surgery.
- Elective surgery that requires introduction of an endotracheal tube.

Exclusion Criteria:

- Patients with a history of preoperative sore throat.
- Patients with gastroesophageal reflux.
- Patients with regurgitation.
- Patients with known allergy to licorice.
- Patients with recent nonsteroidal anti-inflammatory drug medication.
- Patients with Mallampati grade >2 [18].
- Patient requiring >1 attempt for intubation
- Patient who failed to be exubated.

IV - Research Tools:
An assessment sheet: This tool was developed by the researcher based on review of related literature. The overall purpose of the assessment sheet was to:

- To obtain medical and surgical history of the patient.
- To assess patient's knowledge and skills related to licorice.
- To assess the severity of postoperative sore throat at rest and during swallowing while the patient is in the post-anaesthesia care unit, 2 hours, 4 hours and 24 hours postoperative.

The assessment sheet comprised three sections.
Section I: This section addressed the socio-demographic data of the patients and information related to the surgical procedure and anesthesia (duration of tracheal intubation and anesthesia, endotracheal tube size and type and the addition of lidocaine (gel or spray).
Section II: (An interview questionnaire): This section included a set of questions related to:

- Surgical history including history of postoperative sore throat in previous surgeries.
- Patient‘s knowledge about licorice and licorice use for treating sore throat.

Section III :(Numerical Rating Scale): This section included a Numerical Rating Scale ranged from 0-10 to assess the severity of postoperative sore throat at rest and during swallowing with 0 represents (no sore throat) and 10 represents (an imaginable sore throat).
V. Pre Procedure Process:

1- An approval from the local committee of Ethics Committee at Dammam University to involve human subjects from King Fahd University Hospital surgical wards, operating and recovery rooms was obtained.
2- Permission from the hospital administration was obtained to conduct the study.
3- Written informed consent from patients was obtained.

4- Content validity of the assessment sheet was checked by five experts in both medical and nursing field and needed modifications were done namely rephrasing and utilizing simpler semantics for the statements phrases.
5- The reliability of the tool was determined by test and retest method.
6- The gargle solution was prepared by the process of decoction, which involves boiling the licorice powder (500 mg) in 30 ml of water and filtering the decoction. This decoction was used within 24 hours of its preparation and was used for gargling at room temperature. The solution was not compounded with any other additives. It has a sweet taste and patients did not find it unpleasant. The dose of licorice chosen for the study was based on the dosage recommended in other studies which was (500mg in 30 ml water) [6].
7- A pilot study was conducted on 5 patients who met the previously mentioned inclusion criteria in order to test the clarity and applicability of the tool.

VI. Procedure:

- In the pre-operative waiting area, at the morning time of surgery day, the researcher explained the aim of the study and the procedures to every patient who met the inclusion criteria, and then informed consent was obtained for participation in the study.
- The assessment sheet (section one and two) was filled by the researcher through interviewing patients and reviewing patients' records. Confidentiality of information was assured.
- Patients were assigned to a control group or experimental group, each group constitutes 30 patients. Randomization was done through assigning (odd days for the control group and even days for experimental group). The control group followed the routine hospital care and the experimental group gargled with 0.5 g licorice diluted in 30 ml of water.

The control group:

1- Patients followed the routine hospital care.
2- Postoperatively : The researcher assessed the incidence of postoperative sore throat by asking the patients whether they are suffering from sore throat , followed by rating the severity of their throat at rest and on swallowing over 0, 2, 4 and 24 hours through Numerical Rating scale.

The experimental group:

1- Patients were clearly instructed to gargle with this solution and none of the patients swallowed it.
2- Immediately in pre-operative waiting area before admission to the operating room, patients were asked to gargle the licorice for 30 seconds; just 5 minutes before induction of anesthesia and then patients were sent to the operating room.
3- During induction of anesthesia, the researcher was recording the duration of tracheal intubation, endotracheal tube size, type, and the addition of lidocain gel.
4- At the end of the operation, the patients were extubated and sent to the recovery room. In the recovery room, the patients received Intravenous patient-controlled analgesia for their postoperative pain.
5- While the patients were regaining their consciousness in the recovery room, the researcher collected duration of anesthesia from the patients' medical records.
6- Immediately after the patients regained their consciousness, the researcher assessed the incidence of the postoperative sore throat by asking the patients a question framed in appropriate language either English or Arabic. Did you have soreness in your throat at rest? If the answer was yes, another question was followed to assess the severity of

postoperative sore throat. Could you please rate the soreness severity in your throat at rest through a Numerical Rating Scale range from 0-10? Followed by another question to assess postoperative sore throat during swallowing and rating it if present.

7- Thirty to forty-five minutes after surgeries, the patients were sent to their surgical wards. In the same way they were assessed previously, the researcher assessed their incidence and severity of postoperative sore throat at rest and on swallowing over 2, 4 and 24 hours. The three observations were recorded.

VII. Statistical analysis:

After data collection, it was coded and entered to the computer.Statistical Package for Social Science program version 19 was used for data presentation; statistical analysis and finally decision were taking according to the significance depending on the P values. The 5% level of significance was used. Numbers and percents were used for presenting qualitative variables. Tests of normality were carried out for the quantitative variables. Accordingly, if this test was significant ($P \leq 0.05$): the quantitative variables were abnormally distributed, otherwise it was normally distributed. Hence, median and inter quartile range were used for mathematical presentation and non-parametric test were used for analysis. Fisher Exact test was used for comparisons of qualitative variables if Chi Square test was not valid. Mann Whitney test was used for comparison of the median between two different groups respectively. The correlation between the quantitative variables and the comparison of the differences in the median among the categories of the qualitative ones was done by using the appropriate non-parametric tests (Mann Whitney) according to the number of categories.

Results

The findings of the present study are presented in four parts:

Part I: Characteristics of the Studied Sample:

According to their socio-demographic characteristics.

As regards sex, It was observed that more than half of the patients were males in the experimental group (53.3%) while (43.3%) in the control group. The females comprised (46.7%) in the experimental group while they were more than half in the control group (56.7%). The mean age of patients in the experimental group was lower (32.4 ± 8), compared to those in the control group (34.7 ± 9.7).It was also observed that the majority of patients in both the experimental and control groups were Saudi (90.0% and 93.3%) respectively. In addition, it was found that less than half of the patients were single in experimental and control groups (43.3% and 33.3%), respectively.In relation to level of education, it was noticed that less than half of patients in the experimental group were university educated (40%) instead of a control group which comprised (53.3%). However, the school educated patients represented 60% of the experimental group and 46.7% of the control group. More than half of the patients in the experimental group were working (63.3%) while the patients in the control group were not working (56.7%).It also shows that the majority of the patients in the both experimental and control groups were not smoker (76.7% and 73.3%) respectively. Regarding the mean body mass index of patients in the control group was (28.4 ± 4.7) higher than those in the experimental

group (26.5 ± 4.7).However, differences between the two groups of the previously mentioned variables were not statistically significant with (P > 0.05).

Table (1): Distribution of the studied sample according to their socio-demographic characteristics

Characteristics	Experimental group N=30	Control group N=30	Test
Gender • Female • Male	14 (46.7%) 16 (53.3%)	17 (56.7%) 13 (43.3%)	X^2= 0.601 P=0.4
Age • Min-Max • x̄± SD • Med (IQR)	21-54 32.4 ± 8 30.5 (12)	21-52 34.7 ± 9.7 34.5 (17)	Z= 0.821 P= 0.4
Nationality • Saudi • Non-Saudi	27 (90%) 3 (10%)	28 (93.3%) 2 (6.7%)	FETP= 1
Marital Status • Single • Other	13 (43.3%) 17 (56.7%)	10 (33.3%) 20 (66.7%)	X^2= 0.635 P=0.4
Education Level • School education • University education	18 (60%) 12 (40%)	14 (46.7%) 16 (53.3%)	X^2 = 1.071 P=0.3
Occupation • Working • Not working	19 (63.3%) 11 (36.7%)	13 (43.3%) 17 (56.7%)	X^2 = 2.411 P=0.1
Smoking • Smoker • None	7 (23.3%) 23 (76.7%)	8 (26.7%) 22 (73.3%)	X^2 = 0.089 P=0.8
Body Mass Index • Min-Max • x̄± SD	18.37-37.04 26.5 ± 4.7	19.03-37.78 28 ± 4.7	T= 1.162 P=0.3

** indicates a significant association (p-value <0.05)*

According to their surgical history and licorice knowledge

It was found that more than half of the patients had a negative surgical history in the experimental group (66.7%) while the majority in the control group (76.7%). As regards to previous history of postoperative sore throat, it was observed that more than half of patients in the experimental and control group did not complain about it (60% and 57.1%) respectively. Interestingly, only 5% of the studied sample has information about licorice. However, differences between the two groups of the previously mentioned variables were not statistically significant with ($P > 0.05$).

Table (2): Distribution of the studied sample according to their surgical history and knowledge

Items	Experimental group N=30	Control group N=30	Test
Past Surgery • **Yes** • **No**	10 (33.3%) 20 (66.7%)	7 (23.3%) 23 (76.7%)	$X^2 = 0.739$ P= 0.4
Previous Postoperative Sore Throat • **Yes** • **No**	4 (40%) 6 (60%)	3 (42.9%) 4 (57.1%)	FETP= 1
Licorice Knowledge • **Yes** • **No**	2 (6.7%) 28 (93.3%)	1 (3.3%) 29 (96.7%)	FETP= 1

** indicates a significant association (p-value <0.05)*
According to their present surgical data.

Table (3): Distribution of the studied sample according to their present surgical data

Items	Experimental group N=30	Control group N=30	Test
Surgical Procedure • **Head & Neck** • **Others**	11 (36.7%) 19 (63.3%)	13 (43.3%) 17 (56.7%)	$X^2 = 0.278$ P=0.6
Total Duration of Anesthesia • **Min-Max** • **X± SD**	60-150 102 ± 22.6	60-150 100 ± 24.2	T= 0.331 P=0.7
Time Taken for ETT Intubation • **Min-Max** • **X± SD**	5-12 8.6 ± 1.8	5-13 8.5 ± 2.1	T= 0.194 P=0.8

** indicates a significant association (p-value <0.05)*

It was observed that patients had head and neck surgery in experimental and control groups were (36.7% and 43.3%) respectively, while the other types of surgery among patients in experimental and control groups comprised (63.3% and 56.7%) respectively.The mean duration of anesthesia was higher in the experimental group (102 ± 22.6), compared to the mean in the control group (100 ± 24.2). As regards mean time for intubation, it was observed that (8.6± 1.8) in the experimental group compared to the control group (8.5± 2.1).However, differences between the two groups of the previously mentioned variables were not statistically significant with (P > 0.05).

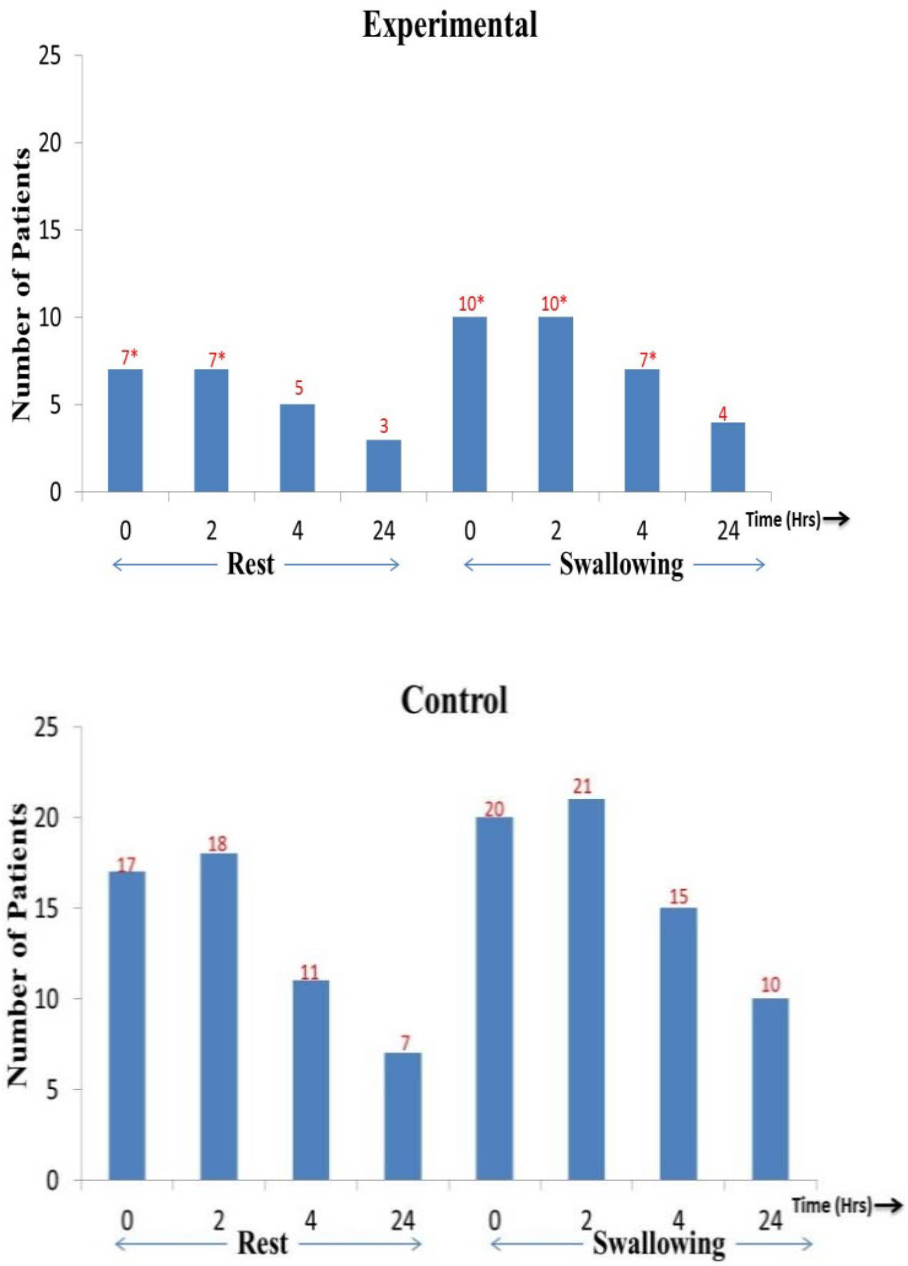
Part II: The Incidence of Postoperative Sore Throat:

Table (4): Shows the incidence of postoperative sore throat during the whole periods of observation at rest and on swallowing. The table illustrated that a statistically significant lower incidence of postoperative sore throat was encountered among experimental compared to control group (23.3% compared to 60%) with (P= 0.004) at rest while representing (33.3% compared to 70%) with (P= 0.004) on swallowing. Licorice gargle protects patients against the occurrence of postoperative sore throat, with (RR=0. 388) at rest and (RR= 0.476) on swallowing. Moreover, Licorice gargle decreases the occurrence of postoperative sore throat by 36.7% for both rest and swallowing. This experimental study declared that to avoid the occurrence of one case postoperative sore throat necessitated the application of Licorice gargle on three patients as (NNT=3).

Table (4): Incidence of postoperative sore throat during the whole periods of observation at rest and on swallowing

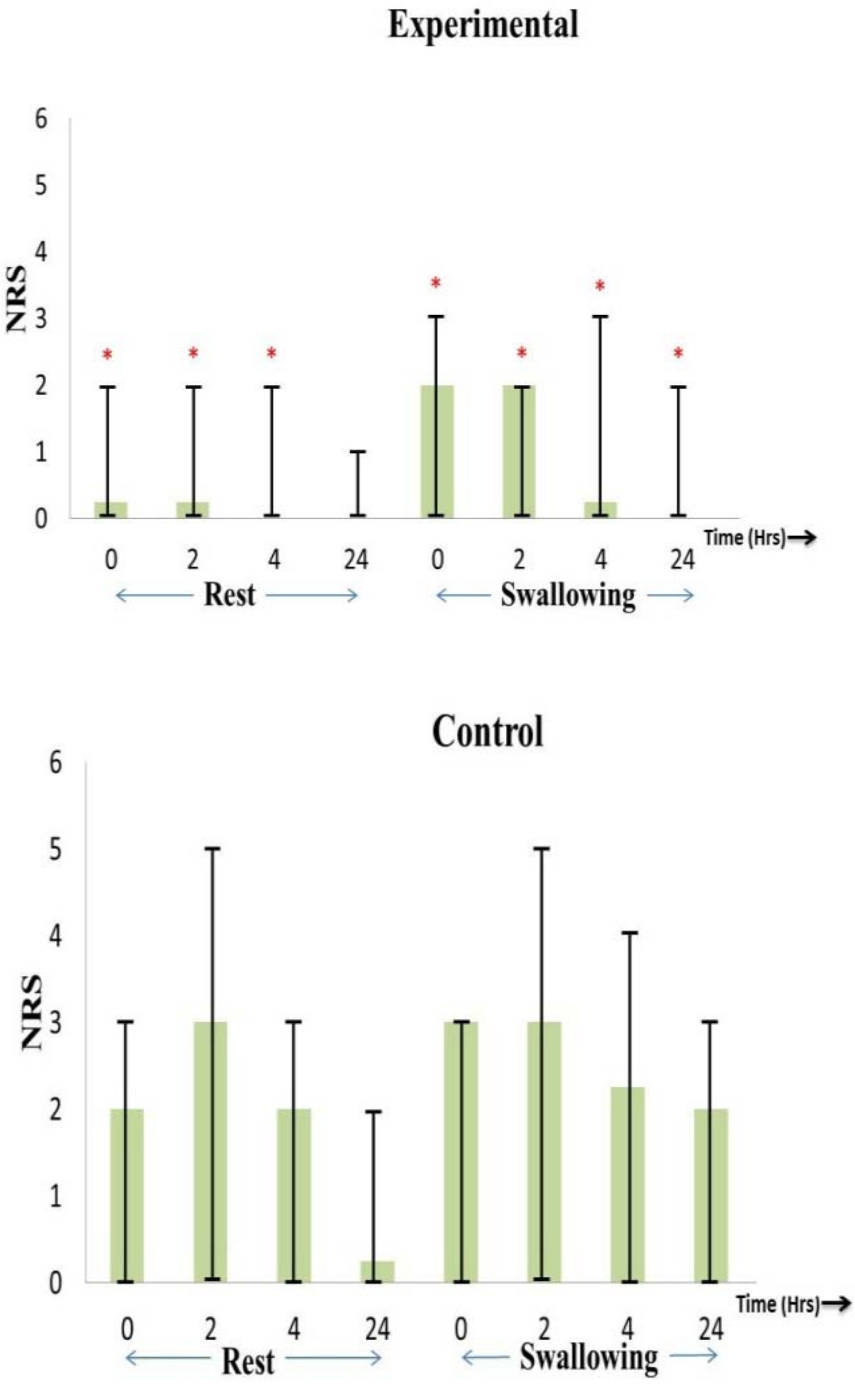
Type Of Group	At Rest		On Swallowing	
	Postoperative Sore Throat		Postoperative Sore Throat	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Experimental group (N=30)	7(23.3)	23(76.7)	10(33.3)	20(66.7)
Control group (N=30)	18(60.0)	12(40.0)	21(70.0)	9(30.0)
Test	X^2 = 8.297 P = 0.004* RR = 0.388 ARR = 36.7% NNT = 2.72 ≅ 3		X^2= 8.076 P = 0.004* RR = 0.476 ARR = 36.7% NNT = 2.72 ≅ 3	

** indicates a significant association (p-value <0.05)*



** indicates a significant association (p-value <0.05)*

Figure 1: Incidence of Postoperative Sore Throat at rest and on swallowing among both experimental and control groups at all-time points.



** indicates a significant association (p-value <0.05)*
NRS= Numerical rating scale

Figure 2: Severity of Postoperative Sore Throat at rest and on swallowing among both experimental and control groups at all-time points.

Part III: The Severity of Postoperative Sore Throat:

Table (5): Shows the severity average of postoperative sore throat during the whole periods of observation at rest and on swallowing.

The table illustrated that a statistically significant lower severity of postoperative sore throat was encountered among experimental compared to control group with (P= 0.002) at rest and (P= 0.001) on swallowing.

Table (5): Severity average of postoperative sore throat during the whole periods of observation at rest and on swallowing

Average	At Rest			On Swallowing		
	Experimental group N=30	Control group N=30	Test	Experimental group N=30	Control group N=30	Test
• Min-max • ± SD • Med (IQR) • MR	0 - 1.75 0.233 ± 0.48 0 (0.12) 24.2	0- 3.25 0.875 ± 0.93 0.625 (1.75) 36.8	Z= 3.125 P=0.002*	0 – 2.5 0.5 ± 0.78 0 (1) 23.55	0 – 3.75 1.433 ± 1.2 1.5 (2.5) 37.45	Z= 3.277 P=0.001*

** indicates a significant association (p-value <0.05).*

Part IV: Relationship between the Incidence and Severity of Postoperative Sore Throat at rest and Characteristics of the Studied Sample.

The incidence of postoperative sore throat at rest in relation to the characteristics of the studied sample.

As regards gender and total duration of anesthesia, there was no significantly associated with the incidence of postoperative sore throat among both the experimental and the control groups. Regarding patient's habit, it was noticed that higher percentage of patients who reported postoperative sore throat were smoker compared to nonsmoker in the experimental group (57.1% and 13%) respectively. This difference was statistically significant associated with incidence of postoperative sore throat with (P= 0.016), while in control group, there was no significant associated. Among the Surgical Procedure, it was found that the patients undergone head and neck surgery reported more postoperative sore throat than other patients who undergone other types of surgery in both experimental group (45.5% and 10.5%) respectively and control group (92.3% and 35.3%) respectively. This difference was not statistically significant associated with incidence of postoperative sore throat among experimental groups while in the control group was significantly associated with the incidence of postoperative sore throat with (P=0. 002).In relation to patient's age, it was observed that the mean age of patients who reported postoperative sore throat was lower compared to those who did not report postoperative sore throat in both experimental group as the mean was (25.7 and 34.5) respectively and control group as the mean age was (31.2 and 40.1) respectively. This lower mean age was statistically significant associated with incidence of postoperative sore throat among both experimental group with (P= 0.009) and for control group with (P=0.01). It was observed that the mean of the body mass index in patients who reported postoperative sore throat was lower compared to those who did not reported

postoperative sore throat in both experimental group (21.95 and 27.95) and control group (26.88 and 29.6) .This lower mean was statistically significant associated with incidence of postoperative sore throat among the experimental group only with (P= 0.002).

The severity average of postoperative sore throat at rest in relation to the characteristics of the studied sample.

As regards to gender and total duration of anesthesia, both were not statistically significant correlated with severity average of postoperative sore throat among both experimental and control groups. In relation to patient's age, it was observed that there was a reverse relationship between the patients age and the severity average of postoperative sore throat in both experimental groups with (r = -0.56) and control group with (r = 0.40) .These reverse relationships were significantly correlated with severity average of postoperative sore throat among both experimental group with (P= 0.001) and control group with (P= 0.03). Among the surgical procedure, it was found that the patients undergone head and neck surgery and patients undergone other surgery rating the severity of postoperative sore throat equally in the experimental group with med=(0) and there was significantly correlated with severity average of postoperative sore throat with (P =0 .048).In the control group, the patients undergone head and neck surgery rating the severity of postoperative sore throat higher than patients undergone other surgery with median=(1.50 and 0) respectively and there was significant correlation with severity average of postoperative sore throat with (P =0 .003). It was observed that there was a reverse relationship between the body mass index and the severity of postoperative sore throat in both experimental group with (r = -0.48) and control group with (r = 0.32). The reverse relationship in experimental group was significantly correlated with severity average of postoperative sore throat with (P= 0. 008). As regards patient's habit, it noticed that the smoker patients rating the severity of postoperative sore throat higher than nonsmokers in the experimental group with median= (0.75 and 0) respectively and there was a significant correlation with severity average of postoperative sore throat with (P =0 .008), while in the control group, the smoker patients rating the severity of postoperative sore throat higher than nonsmoker with median= (1.13 and 0.50) respectively and there was no significant correlation with severity average of postoperative sore throat.

Discussion

The result of the present study showed that the incidence of postoperative sore throat was higher in females than males in both groups. This was in line with the findings of Chen KT et al who stated that the female gender were one of the five risk factors associated with postoperative sore throat. In addition to Higgins P.P et al who stated that postoperative sore throat in ambulatory surgery was associated with female patients [19, 20]. In relation to age, that incidence of postoperative sore throat had increased in younger patients in both groups. This finding was supported by Chen KT et al who stated that younger age group was one of the five risk factors associated with postoperative sore throat. In addition, Higgins P.P et al stated that postoperative sore throat in ambulatory surgery was associated with younger patients [19, 20]. The result of the present study showed that the incidence of postoperative sore throat was higher in smoker

patients compared to nonsmoker patients in both groups. This finding was in line with Biro P et al who stated that the smoking was one of the main factors associated with a sore throat after tracheal intubation. . In addition to Myles et al who mentioned that smoking was associated with an increased risk of respiratory complications postoperative in ambulatory surgery.
The result also confirmed the finding of Leslie G et al, whose result showed that the smoking was associated with increased in risk for postoperative pulmonary complications [21, 22, 23].With Mullen et al who mentioned that overweight and moderately obese patients undergoing non-bariatric general surgery had paradoxically lower crude and adjusted risks of mortality compared with patients at a normal weight, the result of the present study showed that the incidence of postoperative sore throat was increased in patients with lower body mass index in both groups [24].In relation to the incidence of postoperative sore throat, the result of the present study showed that there was statistically higher in patients undergoing head and neck surgery in both groups. The finding was in line with Edomwonyi N.P et al who stated that the incidence of throat complications in throat related surgery was a statistically significant difference to non- throat related surgery. In addition to Chen KT et al who stated that surgical sites within the oral or nasal cavity or around the neck was one of the five risk factors associated with postoperative sore throat. Moreover the result was in the line with Abdullah N.H et al who stated that postoperative sore throat increased after thyroid surgery under general anesthesia and that caused by multiple contributing factors [27, 19, 25].Regarding the duration of anesthesia, the finding of the present study revealed that the incidence of postoperative sore throat was higher in those exposed to greater than 90 minutes anesthetic time in both groups and this was in the line with Kloub R who stated that the postoperative sore throat was significantly associated with duration of anesthesia greater than 90 minutes. Furthermore, the result of the present study was in contrast with Chen KT et al who stated that the duration of anesthesia longer than 2 hours was one of five risk factors associated with postoperative sore throat [26, 19].

The result of the present study showed that there was a statistically significant reduction of the incidence of postoperative sore throat at rest in (0 and 2 h) and during swallowing in (0, 2 and 4 h). This finding was in line with Agarwal A et al who reported that the incidence of postoperative sore throat was reduced in the licorice group compared to control group both at rest and on swallowing at all-time points. This was also supported by Canbay O et al finding which demonstrated that the incidence of postoperative sore throat was significantly higher in control compared with experimental groups at (0, 2, and 24 h) when patients were asked to gargle the ketamine (40 mg in saline 30 ml) for 30 seconds, just 5 minutes before induction of anaesthesia [6, 28]. Moreover, Agarwal A et al findings demonstrated that the incidence of postoperative sore throat was more frequent in the control group compared with the BH (Benzydamine Hydrochloride 15 ml) group at all-time points (0, 2, 4 and 24 h). A significantly more frequent incidence of postoperative sore throat was observed in the control group only at 0 and 2 h when compared with group AS (Aspirin 350 mg). And there was no difference in the incidence of postoperative sore throat was observed between the AS and BH groups at any time when patients were asked to gargle this mixture for 30 seconds, just 5 minutes before induction of anesthesia. Similarly, Ogata et al stated that azunol 4 mg gargle made in 100 ml of water reduced the incidence of postoperative sore throat significantly at all times (0, 2, 4 and 24 h) when performed preoperatively [3, 4].

The result of the present study showed that there was a statistically significant difference in reducing the severity of postoperative sore throat at rest in (0, 2 and 4 h) and during swallowing in (0, 2 and 4 h). There was also statistical change but not significant in reducing the severity of postoperative sore throat at rest in (24 h) and during swallowing in (24 h) between the experimental and control groups. This was in line with Agarwal A et al finding which revealed that the severity of postoperative sore throat was reduced in the licorice group compared with the control group both at rest in (0, 2 and 4 h) and on swallowing at all-time points (0, 2, 4 and 24 h) postoperatively . This was also supported by Canbay O et al finding which demonstrated that the severity of postoperative sore throat was statistically significantly higher at 4 and 24 h in control compared with experimental groups when patients were asked to gargle the ketamine (40 mg in saline 30 ml) for 30 seconds, just 5 minutes before induction of anaesthesia [6, 28]. Moreover, Agarwal A et al finding demonstrated that there was a higher severity of postoperative sore throat among control group compared with the BH (Benzydamine Hydrochloride 15 ml) and AS (Aspirin 350 mg) groups at 0 and 2 h, which was statistically significant. While the severity of postoperative sore throat was similar between groups AS and BH at all times when patients were asked to gargle this mixture for 30 seconds, just 5 minutes before induction of anesthesia. Similarly, Ogata et al stated that azunol 4 mg gargle made in 100 ml of water had reduced the severity of postoperative sore throat significantly when performed preoperatively in the four times (0, 2 ,4 and 24 h) [3,4].

Conclusion

Based on the findings of the present study, it can be concluded that Licorice gargle performed 30 seconds, just 5 minutes before anesthesia was effective in attenuating the incidence and severity of postoperative sore throat. Regarding the incidence and severity of postoperative sore throat, a statistically significant difference have been found during the whole periods of observation at both rest and swallowing between the experimental and control groups. To avoid the occurrence of one case postoperative sore throat, we need to perform Licorice gargle on three patients.

Recommendations

The present study recommended the followings:

- Application of licorice gargle 30 seconds, just 5 minutes before induction of anesthesia.
- Increase community awareness regarding the benefits of licorice regarding anti-inflammatory and anti-allergic, antitussive, cardiovascular, anti-tumor, antimicrobial and antiviral actions, putting into consideration the side effects that might arise in over dosage.

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