

Posttonsillectomy pain relief and epithelialization with honey

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Aim: To assess the ability of honey to reduce pain and promote epithelialization on posttonsillectomy wounds.

Materials and methods: A prospective randomized control study was conducted on 60 patients undergoing tonsillectomy from November 2007 to September 2008 at University Malaya Medical Centre. The test group received honey application on the tonsillar bed and the control group had placebo applied. The pain relief was analyzed along with the amount of analgesia consumed, and wound epithelialization was monitored and recorded accordingly.

Results: Twenty-one patients from each group were finally analyzed after excluding patients that did not complete the study or fit the criteria. Pain relief and wound epithelialization were observed to be better in the honey-treated group compared to the placebo group. However, the difference was not statistically significant.

Conclusion: This study shows that the rate of pain relief and early return to work and school were faster in both groups when compared to the current practice. However, there was no statistical significance seen in either the honey or placebo groups in terms of pain relief and wound epithelialization, which could be due to improper choice of placebo. The potential use of honey in wound healing and pain relief should be further explored with more studies.

Key words: Honey, posttonsillectomy, pain relief, wound epithelialization

1. Introduction

Tonsillectomy continues to be one of the most common surgical procedures in children and adults in ear, nose, and throat medicine. Following surgery, severe pain and difficulty swallowing are common complaints encountered in both children and adults. Despite improvements in surgical and anesthetic techniques, the pain when not well controlled causes delayed food and water consumption, leading to dehydration and increased morbidity (1). Various studies have been done to determine the best methods of pain management with varying results. Surgeons have given acetaminophen (2), dexamethasone (3), gabapentin (4), fibrin glue (5), and fusafungine (6). Various surgical techniques have been described for better pain relief and wound healing, such as harmonic scalpel (7), cryotherapy (8), microdebrider (9), and laser coblation (10).

Honey has been used since ancient times for the treatment of some respiratory diseases and for healing of skin wounds. Many studies have been done to explain the various properties found in honey that contribute

to their antioxidant, antiinflammatory, antibacterial, antiviral, antiulcerogenic, antihepatotoxic, antiallergic, and hypolipidemic properties (11–14). Previous study (15) has shown that honey healed chronic wounds and ulcers that had failed to heal under conventional treatment.

Mechanical and thermal injuries may occur in the tonsillar fossa during tonsillectomy, and postoperatively this location remains an open wound. Therefore, patients complain about throat pain, particularly during swallowing. This study is undertaken to show that honey, when used regularly following tonsillectomy, may have positive effects on tissue repair, thus decreasing postoperative pains.

2. Materials and methods

Pure, unprocessed honey was obtained from an apiary under the care of the Department of Agriculture, Johor, Malaysia. The honey was produced by *Apis mellifera* bees kept at *Melaleuca* sp. plantations.

The placebo was produced using glucose syrup resembling the sugar composition of honey. It was prepared

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by the Pharmacy Department of the Faculty of Medicine, University of Malaya.

This was a randomized, prospective, experimental study over a period of 11 months (November 2007 to September 2008). Patients were selected from those who were going for elective tonsillectomy in a tertiary referral center. The inclusion criteria and exclusion criteria were as follows:

Inclusion criteria

1. Three or more severe recurrent attacks of tonsillitis in 2 consecutive years.
2. Tonsillectomy done for obstructive sleep apnea.
3. Tonsillectomy done for unilateral enlargement to rule out lymphoma.
4. Adenotonsillectomies for recurrent adenotonsillitis.

Exclusion criteria

1. Diabetes mellitus.
2. Allergy to acetaminophen or honey.
3. Coagulation disorders.
4. Tonsillectomies other than cold dissection method.
5. Postoperative bleeding and infection.

Sixty patients were included in this study using the inclusion and exclusion criteria. Patients were randomized using a blind envelope system during their visit, kept in their folder and only opened after the tonsillectomy for administration of either honey in the study group or placebo in the control group. In the study group, patients were treated with a tablespoon (15 mL) of honey every hour when awake and acetaminophen (doses of 15 mg/kg at a maximum of 5 times/day) as needed, while in the control group, placebo (glucose + caramel) and acetaminophen were used in a similar manner.

All patients underwent an operative technique with cold dissection and hemostasis was secured using monopolar diathermy. Postoperatively, the intensity of postoperative pain was assessed using a visual analogue pain scale (VAS), in which scores ranged from 0 (absence of pain) to 10 (worst possible pain), allowing the patient to mark a point along the scale that best represented his or her pain. The study and placebo groups were administered medication as soon as patients were able to take it orally. Adults and parents of the children were asked to administer acetaminophen only when the patient complained of throat pain. Placebo and honey were given when the patients were able to orally take items. Total analgesic consumption was recorded daily during hospitalization and then following discharge from the hospital until day 5. After discharge from the hospital, patients and parents were instructed to record pain and analgesic consumption at home. Any occurrence of postoperative complications such as bleeding and infection were recorded. These patients were excluded from the study because they required intravenous or oral antibiotics for further management.

During follow-up, patients were examined on postoperative days 1, 4, 7, and 14 to monitor tonsillar fossa recovery. Tonsillar fossa epithelization was staged as follows (16):

Grade I: Completely covered with fibrin.

Grade II: Beginning of epithelization (epithelia covering less than 30%).

Grade III: Semiepithelized (epithelia covering 30%–75%).

Grade IV: Almost complete epithelization (more than 75%).

Grade V: Completely epithelized.

University Malaya Medical Centre Ethical Committee clearance was obtained prior to the recruitment of volunteers for the study.

3. Results

In the study group, 5 patients had tonsillar infection associated with bleeding that required intravenous antibiotics. They were therefore excluded from the study. One patient requested to quit the study, and 3 patients did not attend follow-up. In the placebo group, 7 patients were treated for infection, and 2 patients did not complete the study. Therefore, a total of 21 patients in each of the study and placebo groups were finally analyzed.

The age groups of patients were divided as follows: 15 years and younger, 16–30 years, and older than 30 years. Most of the patients were in the youngest age group, and there were more female patients than male patients. The majority of the patients were Malays (81%) in both groups, followed by Indians. There was only one Chinese patient in the placebo group.

The indication for tonsillectomy was predominantly recurrent tonsillitis (86%) in both groups. Few patients came with indication for adenotonsillitis and obstructive sleep apnea. In the other group, the indication was superior pole cleft and lymphoma.

3.1. Pain scoring

Pain was scored using the VAS. Using the t-test and chi-square test, the pain scoring was analyzed from day 1 to day 5 at 0600 and 1800 hours, respectively. There was no significant difference of mean pain at 1800 hours on day 1 and day 3 between the honey and placebo groups. The P-value was 0.793 and 1.00, respectively. The grading of pain was measured as follows: no pain as 0, mild pain 1–3, moderate pain 4–7, and severe pain >7. (Tables 1 and 2; Figures 1 and 2).

3.2. Wound epithelization

The wound epithelization of the tonsillar fossa was examined on days 1, 4, 7, and 14. Grading of the wound was done according to Ozlugedik et al. (16). Wound healing in both the honey and placebo groups was in a stepwise order. Those patients who on follow-up had episodes of bleeding

Table 1. Pain scores of patients at 1800 hours on day 1.

	Honey		Placebo		P-value
	No. of patients	%	No. of patients	%	
No pain	3	14	1	5	0.409
Mild pain	3	14	1	5	
Moderate pain	7	33	11	52	
Severe pain	8	38	8	38	
Total	21	100	21	100	

Table 2. Pain scores of patients at 1800 hours on day 3.

	Honey		Placebo		P-value
	No. of patients	%	No. of patients	%	
No pain	5	24	3	14	0.613
Mild pain	7	33	9	43	
Moderate pain	8	38	9	43	
Severe pain	1	5	0	0	
Total	21	100	21	100	

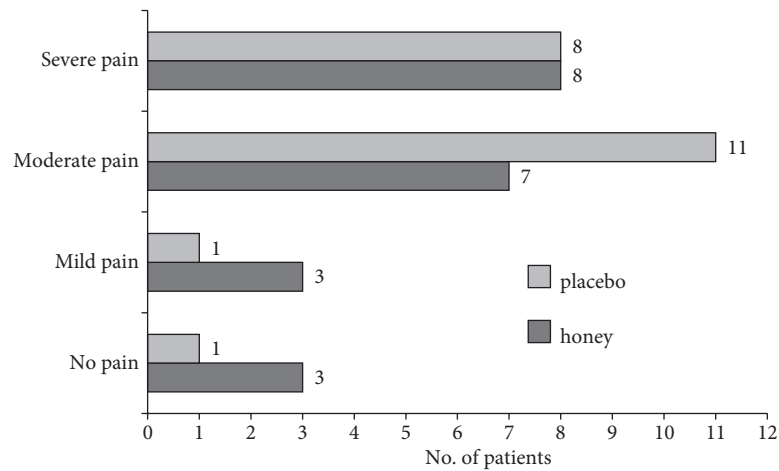


Figure 1. Pain score at 1800 hours on day 1 in honey and placebo groups.

at home, worsening of pain, or inability to swallow food and drink with increasing thickness of slough at the tonsillar fossa were excluded from the study. These patients were treated with intravenous or oral antibiotics.

Statistical analysis using the t-test showed no significant difference in wound epithelialization among the honey group as compared to the placebo group. Most of the patients had their wounds fully epithelialized by day 14 (Figures 3–5).

3.3. Frequency of analgesia consumed

The amount of analgesia consumed by patient per day as necessary was calculated and analyzed from day 1 to day 5. Acetaminophen was advised to be taken only as needed for both the honey and the placebo group. Patients were given 15 mg/kg at a maximum of 5 times per day.

There was no statistical significance found in either the honey or the placebo group. However, the pattern of analgesia taken followed a downward trend, with most

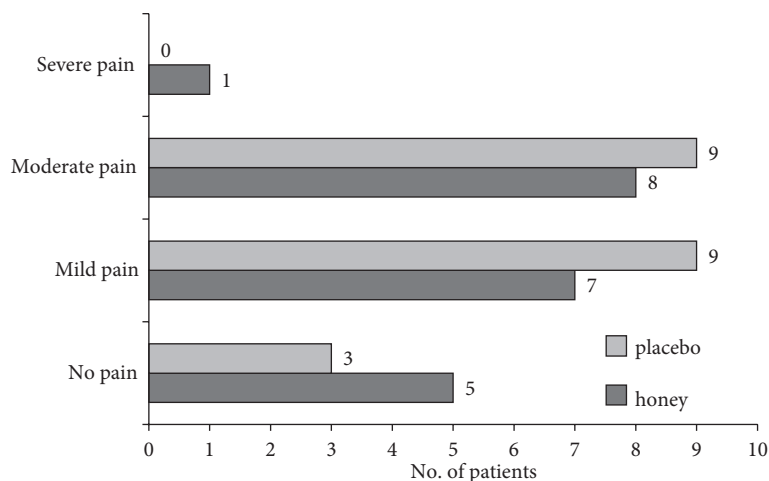


Figure 2. Pain score at 1800 hours on day 3 in honey and placebo groups.

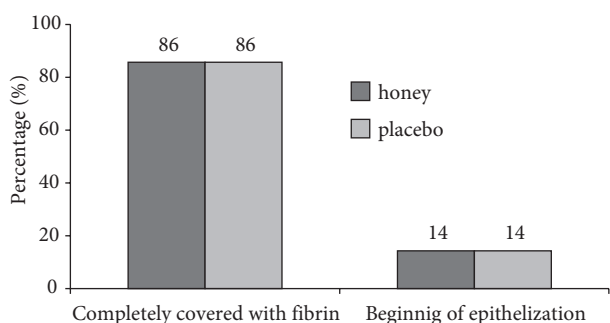


Figure 3. Wound grading on day 1 in honey and placebo groups.

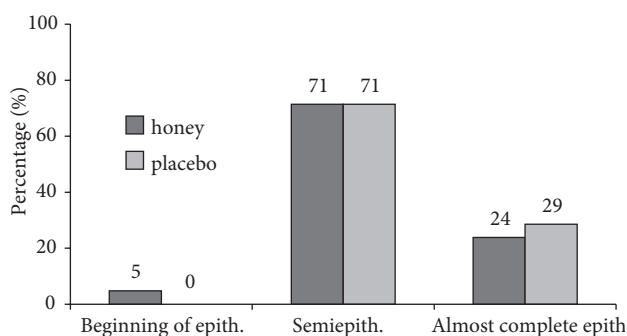


Figure 5. Wound grading on day 7 in honey and placebo groups.

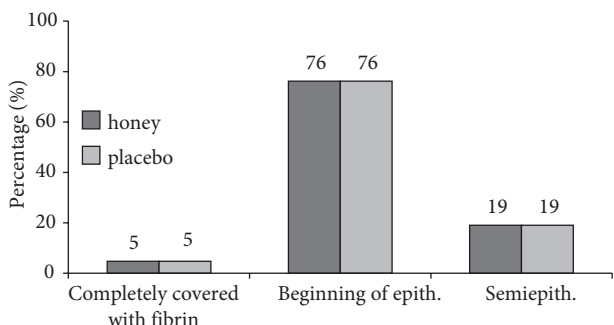


Figure 4. Wound grading on day 4 in honey and placebo groups.

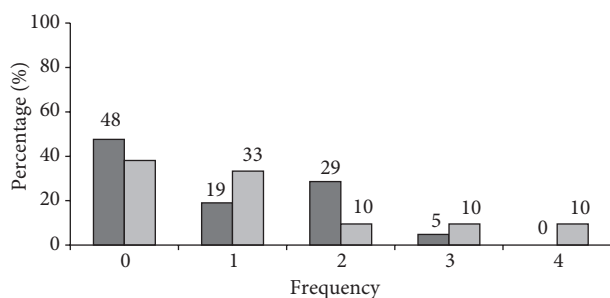


Figure 6. Frequency of analgesia consumption on day 1 in honey and placebo groups.

patients free of pain by the postoperative day 4. The P-value for day 1 was 0.251 and for day 3 it was 0.216.

Analysis was also done between children (≤ 15 years age) and adults (16–30 and >30 years grouped together). There was no statistical significance seen between the groups, and therefore they are not shown here (Figures 6 and 7).

3.4. Complications from operation

The most common postoperative complication was ear pain. Those who complained of bleeding from the tonsillar

fossa or worsening of dysphagia were removed from the study because they required antibiotics for further treatment.

Sixteen patients from the honey group and 17 patients from the placebo group were without any complications. From the honey group, 6 had ear pain and 5 had bleeding with infection. In the placebo group, 5 had ear pain, and 7 had bleeding with infection (Figure 8).

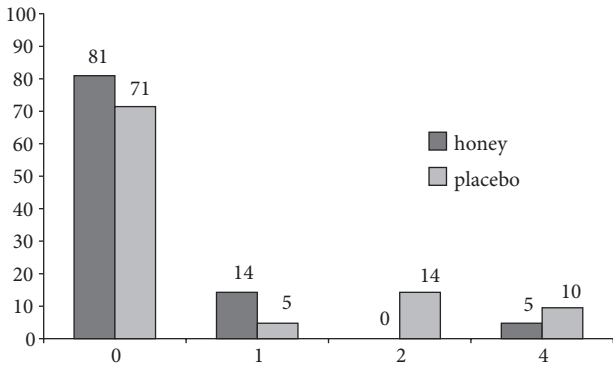


Figure 7. Frequency of analgesia consumption on day 3 in honey and placebo groups.

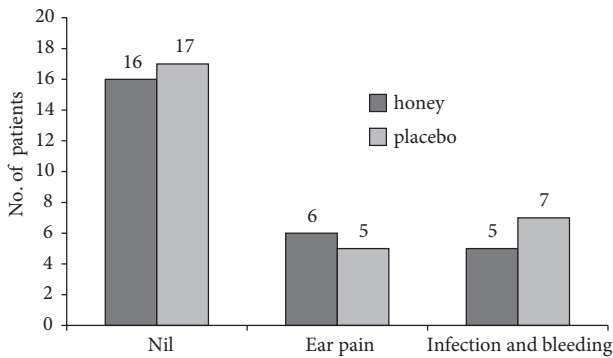


Figure 8. Complications in honey and placebo groups.

4. Discussion

The honey used in this study was obtained from an apiary in Malaysia and was gamma-irradiated before use. Gamma irradiation was done to make sure there were no *Clostridium* spores in the honey. The honey was certified to be pure after it was analyzed at the Department of Molecular Medicine of the Faculty of Medicine, University of Malaya. Many studies have been conducted on this honey to show its superior qualities, having powerful antioxidant, antiinflammatory, and antibacterial activities (11–15).

The placebo used had physicochemical characteristics similar to honey in terms of content, consistency, color, and taste.

The patients that fulfilled the criteria and consented to the study underwent cold tonsillectomy dissection. They were then treated either honey with analgesia or placebo with analgesia. The honey and placebo were advised to be consumed hourly, at 1 tablespoon per dose, as soon as the patients could start oral consumption. The analgesia was given as necessary for pain at 15 mg/kg, with a daily maximum of 5 doses. The pain was assessed using the VAS from 0 to 10, and wound epithelization according to the classification of Ozlucedik et al. (16).

Pain following tonsillectomy is assumed to be caused by postoperative inflammation, nerve irritation, and pharyngeal spasm. Considering that the tonsillar fossa is healed in the form of an open wound after tonsillectomy, it could be expected that honey accelerates the recovery of wounds and decreases postoperative pain. However, it is not possible to keep honey in continuous contact with the tonsillar fossa as it is in wound dressings. Therefore, honey application intervals were kept frequent.

In this study, the difference between the placebo and honey groups was statistically not significant regarding both the VAS scores and the amount of analgesia taken on the first 5 postoperative days for pain. Most patients in both groups had pain relief by postoperative day 5. Wound healing was comparable in both groups and showed no significant difference. The wounds were mostly healed by the first week, and therefore, along with pain relief, patients in both the placebo and honey groups were able to get back to school and work after the first posttonsillectomy week. In a study done by Akbas et al. (6), the effect of fusafungine on postoperative pain and wound healing after pediatric tonsillectomy took 10–14 days, and pain relief was not significant in the first week, but only on days 10 and 14.

The antibacterial effect of honey is attributed to a number of factors including osmotic effect of its high sugar content (about 76%), the release of hydrogen peroxide by the action of glucose oxidase on glucose, additional nonperoxide organic antibacterial factors, and its low pH of 3.5. All of these factors inhibited growth of many organisms (13). The quantity of reducing sugars in both groups might have helped in relieving pain as well as reducing edema.

Stewart et al. (3) showed how dexamethasone reduces pain after tonsillectomy in adults. They found that dexamethasone taken for 8 days in conjunction with piroxicam produced a significant reduction in pain scores and in the amount of simple analgesia required when compared with patients treated with piroxicam alone. When dexamethasone alone was given, no significant difference in pain scores was recorded. When compared with patients treated with piroxicam alone, however, analgesic requirements were significantly lower in the steroid-treated group. Dexamethasone is effective in reducing postoperative vomiting when used either alone or in conjunction with ondansetron. In this study, different anesthetists had given different intraoperative medications. Some had included a single dose of dexamethasone of 8 mg to reduce the postoperative nausea and vomiting caused by the anesthetic medication and blood ingested intra- and postoperatively. It is recommended that in any future study, a standard protocol should be included to get better results.

In a study conducted by Dhiwakar et al. (17) using antibiotics to improve recovery after tonsillectomy, they found that antibiotics significantly reduced the number of subjects with fever and the duration of halitosis, and marginally reduced the time taken to resume normal activity. However, they observed no significant effect in reducing pain scores or need for analgesia. Similarly, there was no significant difference in the time taken to resume a normal diet or incidence of significant and total hemorrhage. They concluded that antibiotics appear to be effective in reducing some, but not all, morbid outcomes following tonsillectomy, and may increase the risk of adverse events such as rash and oropharyngeal candidiasis. Ozlugedik et al. (16), who also used honey to treat posttonsillectomy pain relief and wound healing, also used antibiotics in both the study and placebo groups. This along with honey could have contributed to the favorable outcome in their study. In this study, antibiotics were omitted at our medical center. Antibiotics are not routinely given unless the tonsillar fossa has excessive exudates, or in cases of recent infection with excessive bleeding or difficulty in securing hemostasis resulting in a prolonged surgical time.

In a 1-year posttonsillectomy follow-up survey (18), the mean frequency of tonsillitis per year and the mean

number of work days missed was reduced. The average number of days of medical leave required postoperatively in that study was 14.17 days. At our medical center, an average of 14 days of medical leave is also given after tonsillectomy. In this study, most of the patients recovered by the first week and thus could return to work and school early.

In conclusion, this study showed that both honey and placebo had a positive effect in pain relief and wound epithelialization in all patients. The nonsignificant difference observed in both the honey and placebo groups could be due to improper placebo choice. In this study, the placebo was a mixture of glucose syrup with coloring material to mimic honey. It is expected that a placebo of sucrose solution instead of glucose solution would have produced a more significant difference between the 2 groups. The potential use of honey in wound healing and pain relief should be further explored with more studies.

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