



# The effectiveness of Tualang honey in reducing post-tonsillectomy pain

## Tonsillektomi sonrası ağrıyı azaltmada Tualang balının etkinliği

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### ABSTRACT

**Objectives:** This study aims to evaluate the effectiveness of Tualang honey in reducing post-tonsillectomy pain.

**Patients and Methods:** The study included 63 patients (31 males, 32 females; mean age 10±4.16 years; range 3 to 18 years) who were planned to undergo tonsillectomy. Patients were randomized into two groups. Treatment group received topical Tualang honey intraoperatively followed by oral consumption of Tualang honey three times daily for seven days with intravenous sultamicillin three times daily for first and second day followed by oral sultamicillin twice daily for five days. Control group received intravenous sultamicillin for two days followed by oral sultamicillin twice daily for five days. Patients' pain was assessed according to visual analog scale, frequency of waking up at night due to pain, and additional use of analgesic from postoperative first to seventh day. Results from each group were statistically compared.

**Results:** Early postoperative pain was relieved slightly faster in Tualang honey + antibiotic group; however, the difference between groups was not statistically significant. On postoperative seventh day, all of patients (100%) in Tualang honey + antibiotic group experienced no pain compared to the antibiotic only group. Frequencies of waking up at night and use of analgesic were lower in the Tualang honey + antibiotic group compared to antibiotic only group.

**Conclusion:** Early postoperative pain was relieved slightly faster in Tualang honey + antibiotic group, which may be attributed to the soothing effect of honey.

**Keywords:** Honey; pain relief; tonsillectomy.

### ÖZ

**Amaç:** Bu yazıda tonsillektomi sonrası ağrıyı azaltmada Tualang balının etkinliği değerlendirildi.

**Hastalar ve Yöntemler:** Çalışmaya tonsillektomi geçirmesi planlanan 63 hasta (31 erkek, 32 kadın; ort. yaş 10±4.16 yıl; dağılım 3-18 yıl) dahil edildi. Hastalar rastgele iki gruba ayrıldı. Tedavi grubuna ameliyat sırasında topikal Tualang balı verildi, bunu birinci ve ikinci gün günde üç kere intravenöz sultamisilini takiben beş gün günde iki kere oral sultamisilin ile yedi gün günde üç kere oral Tualang balı tüketimi izledi. Kontrol grubuna iki gün intravenöz sultamisilini takiben beş gün günde iki kere oral sultamisilin verildi. Hastaların ağrısı görsel analog skalasına, ağrı nedeniyle gece uyanma sıklığına ve ameliyat sonrası bir ila yedinci gün ek analjezik kullanımına göre değerlendirildi. Her iki grubun sonuçları istatistiksel olarak karşılaştırıldı.

**Bulgular:** Erken ameliyat sonrası ağrı Tualang balı + antibiyotik grubunda nispeten daha hızlı iyileşmekle beraber, gruplar arasındaki farklılık istatistiksel olarak anlamlı değildi. Ameliyat sonrası yedinci günde Tualang balı + antibiyotik grubundaki hastaların tamamı (%100) sadece antibiyotik kullanan gruba kıyasla ağrı hissetmedi. Gece uyanma ve analjezik kullanma sıklığı Tuareng balı + antibiyotik grubunda sadece antibiyotik kullanan gruba kıyasla daha düşüktü.

**Sonuç:** Erken ameliyat sonrası ağrı Tualang balı + antibiyotik grubunda nispeten daha hızlı iyileşti; bu durum balın sakinleştirici özelliğine bağlanabilir.

**Anahtar Sözcükler:** Bal; ağrı giderimi; tonsillektomi.



Tonsillectomy is a common operative procedure with a spectrum of complications. These include post-tonsillectomy pain, infection, otalgia, velopharyngeal insufficiency and secondary bleeding.<sup>[1]</sup> Among these morbidities, postoperative throat pain is clinically important as it poses a tremendous effect on the patient's recovery from the operation. In the pediatric population, the pain can give rise to unwanted effects not only on physical well-being but also on the psychological status of patients and the family. These effects include poor oral intake, disturbed sleep cycle, poor performance, psychological effects of depression and anger<sup>[2]</sup> that could definitely cause significant impairment of the patient's health status and family. Improvement in general emotional and social status was observed at three weeks post-tonsillectomy.<sup>[3]</sup> If post-tonsillectomy pain could be optimized during this period, the outcome would be more favorable. The recovery period would be hastened, the hospital stay shortened, use of medications reduced and the psychological effects on patient and family minimized.

The oropharynx and tonsillar fossa are exquisitely sensitive. They are well innervated locally by branches of the trigeminal and glossopharyngeal nerves and are highly represented in the somatic cerebral cortex.<sup>[4]</sup> Lavy<sup>[5]</sup> has reported that the time course of pain resolution after tonsillectomy is between day 1 and day 14. It has been suggested that pain after tonsillectomy was normally caused by inflammation, nerve irritation, and also spasm of the exposed pharyngeal muscles.<sup>[6]</sup> Pain does not completely subside until the muscles become covered with mucosa 14-20 days after surgery.<sup>[7]</sup> Within this duration, there must be an effective use of analgesia in order to optimize postoperative pain management. Non steroidal anti-inflammatory drugs (NSAIDs) for example have been used as a standardized regimen, but patients still suffer residual pain while swallowing.<sup>[8]</sup>

Several adjuvant techniques such as administration of potent systemic analgesics, local infiltration with anesthetics and topical anesthetic sprays have all been studied but their efficacy remain to be proven.<sup>[9]</sup> Application of sucralfate as a protective barrier following tonsillectomy has been found to promote healing with significant pain reduction during the

postoperative period.<sup>[8]</sup> Transcutaneous electric nerve stimulation for post-tonsillectomy pain has also been studied. However, apart from the use of various equipment, it has no convincing positive results towards relieving pain.<sup>[10]</sup> All these drugs and machines are costly and have potential side effects which can complicate patient management postoperatively. Numerous clinical studies locally and internationally have shown the positive properties of different types of honey. Ozlugedik et al.<sup>[11]</sup> has shown that oral administration of honey following pediatric tonsillectomy relieved postoperative pain and decreased the need for analgesics.

With use of honey, they found that the number of painkillers taken differed significantly until the eighth postoperative day. Tonsillar fossa epithelialization was also found to be more rapid in the group treated with honey. Tonks et al.<sup>[12]</sup> has shown that honey stimulates monocytes to release cytokines, tumor necrosis factor alpha (TNF- $\alpha$ ), Interleukin-1 beta (IL-1 $\beta$ ) and IL-6. These mediators are involved in the regulation of the inflammatory process and fibroblast formations. In Malaysia, there are several researches that have been conducted revealing the true positive properties of Tualang honey. Ghazali<sup>[12]</sup> showed that local Tualang honey has low water activity and low pH (average pH 3.9) due to formation of gluconic acid. These properties contribute to the antibacterial activity of Tualang honey. Tumin et al.<sup>[13]</sup> showed that Tualang honey exhibits substantial antibacterial properties against *Escheria coli*, *Salmonella typhi* and *Streptococcus pyogenes*. Mohd Nasir et al.<sup>[14]</sup> also showed Tualang honey has bactericidal as well as bacteriostatic effects and is useful as a dressing in burn wound management because it is less sticky and easier to apply to the wound site. Khalil et al.<sup>[15]</sup> showed that Tualang honey contains a large amount of phenolic content which has good correlation to its anti oxidant activity. Currently, there are no studies we know of that specifically document the use of Tualang in reducing postoperative tonsillectomy pain. Therefore, it is the aim of the present study to investigate the effectiveness of the locally available Tualang honey in reducing post-tonsillectomy pain.

## PATIENTS AND METHODS

This open labeled prospective randomized study was carried out after obtaining approval from the

University Human Ethical Committee (Approval number: USMKK/PPP/JEPem[217.3.(07)]) and was performed in adherence with the Declaration of Helsinki. The honey was given with the intention to treat. The subjects were recruited from patients who attended ORL-HNS Clinic from period of October 2009 to November 2011 and were clinically indicated for tonsillectomy.

Patients were recruited according to the inclusion and exclusion criteria. Inclusion criteria were patients between the age of three to 18 years old, patients diagnosed with chronic tonsillitis or recurrent acute tonsillitis with or without obstructive symptoms and patients without any other medical illnesses. Exclusion criteria include non-consented patients, patients with allergy to honey or other honey based products, and patients with allergy to penicillin based antibiotics. A total of 68 patients were randomized into two groups of 38 patients in each group. One group received Tualang honey and antibiotic, while the control group received only the antibiotic. The patients underwent intervention as outlined in the study protocol flow chart (Figure 1). Patients were routinely examined at clinic a day before the operation. The procedures were explained to the patients and the parents in details and consent were taken if the patient was agreeable for the recruitment. The surgery was performed under general anesthesia. The tonsils were dissected from the anterior to posterior palatoglossal fold by Hurd tonsillar dissector. Adenoids were curetted by adenoid curette. Hemostasis was secured by tonsillar and adenoidal gauze compression and bipolar cautery. The parents were also explained in details on how pain score chart assessment should be performed.

The Tualang honey + antibiotic group received topical 2-3 mL Tualang honey intraoperatively (applied on both tonsillar bed by a 3 mL syringe) followed by oral consumption of honey at 4 mLs three times daily (tds) for seven days together with intravenous sultamicillin at 25 mg/kg tds for 1-2 days followed by oral sultamicillin twice daily for five days. The antibiotic only group received only intravenous sultamicillin at 25 mg/kg body weight for two days followed by oral sultamicillin twice daily for five days. The Tualang honey used in this study was supplied by the Federal Agriculture Marketing Authority (FAMA). A box of honey containing

seven sachets of Tualang honey was supplied to the patients.

One sachet contains 12 mL of pure Tualang honey. They were advised to consume one sachet of honey per day in three divided doses, orally for seven consecutive days. Patients and parents were explained thoroughly regarding the consumption of honey and antibiotics.

Patients were assessed on severity of pain using facial pain scale for patients below the age of seven years old and visual analog scale (VAS) for patients older than seven years old. The accompanying parent or caretaker was asked to perform the assessment and complete the pain score chart form. The caretaker was also asked to

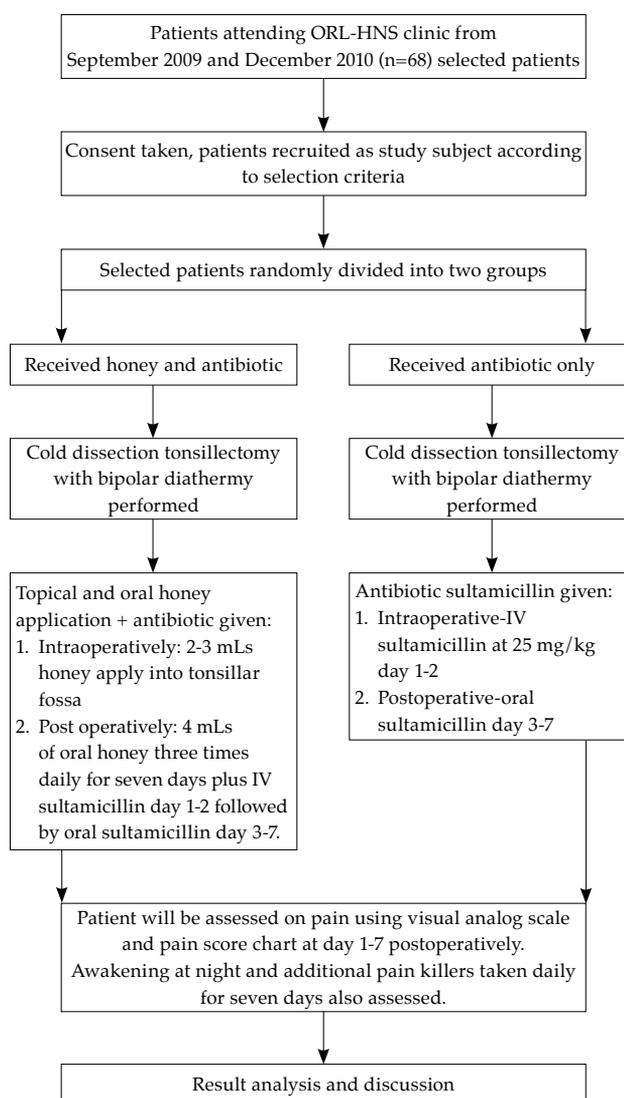


Figure 1. Flow chart of the study.

**Table 1.** Demographic variables of both study groups

	Tualang honey + antibiotic group			Antibiotic only group		
	n	%	Mean±SD	n	%	Mean±SD
Gender						
Male	18	51.40		13	46.40	
Female	17	48.60		15	53.60	
Age			8.97±3.85			11.15±4.47
Weight			33.10±21.05			36.50±16.51

record the frequency of awakening at night due to pain and the frequency of additional analgesia (Paracetamol) used in the form provided. In case of any unwanted complications or side effects, the patients and parents were asked to inform the investigator and this event was recorded in the form provided.

#### Statistical analysis

PASW Statistics for Windows, version 18.0 software program (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Difference between groups in terms of VAS, frequency awakening at night due to pain, numbers of analgesia taken daily were routinely evaluated with repeated measure ANOVA test. Bonferroni correction was applied for multiple comparisons. The level of significance was set at 0.05.

### RESULTS

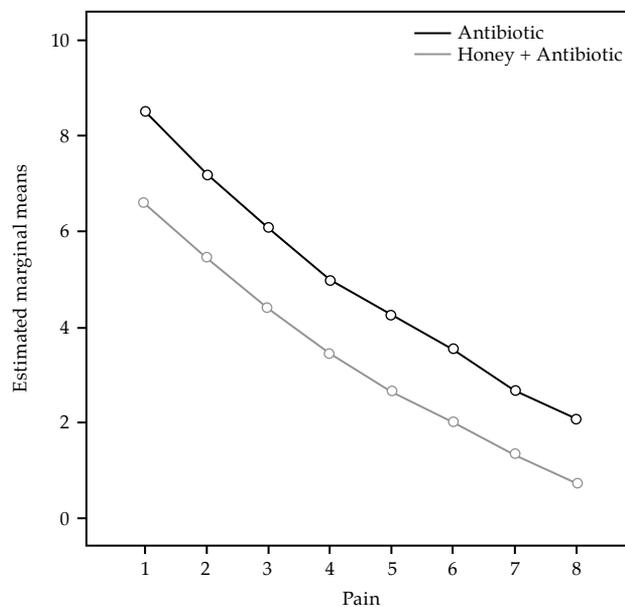
A total of 68 patients were enrolled in the study. However five patients were lost during follow-up and were excluded. A total of 63 patients were included in the study protocol and data analysis, 35 in the Tualang honey + antibiotic group and 28 in the antibiotic only group. There were 31 male and 32 female patients with the average age of 9 and 11 years old in the Tualang honey + antibiotic group and antibiotic only group respectively (Table 1). The mean body weight was 33.31 kg for patients in Tualang honey + antibiotic group and 36.50 kg for patients in the antibiotic only group.

There was no significant difference in the analysis of pain scores between both groups over time (Greenhouse-Geisser for pain versus group interaction,  $p=0.655$ , Maunchly's test  $p\leq 0.001$ ) (Figure 2). Paired t test showed that there was a significant difference in the mean of pain score

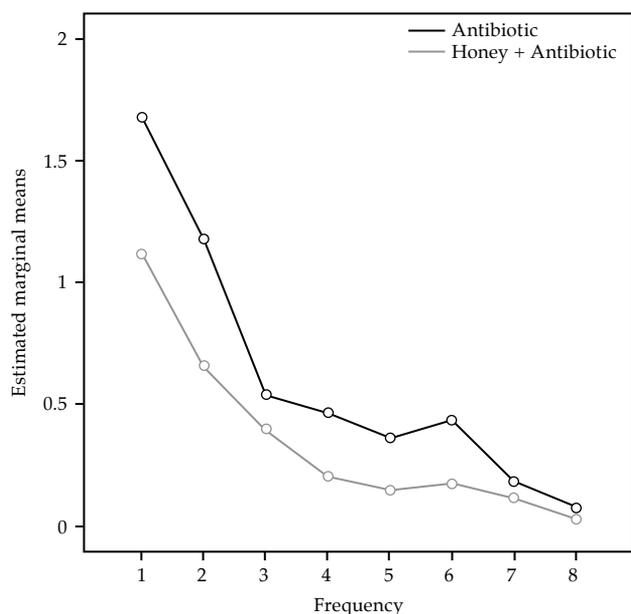
from day 1 to day 7 except at day 4-5 in the antibiotic group. The mean of pain score was however lower in the Tualang honey + antibiotic group in all days postoperatively.

There was no significant difference in the frequency of awakening at night due to pain between the two study groups. Frequency of awakening at night however was lower in the Tualang honey + antibiotic group compared to the antibiotic only group (Figure 3).

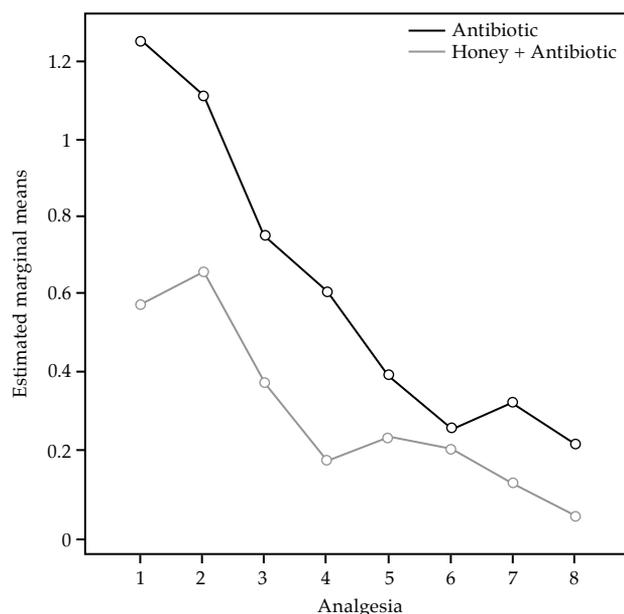
There was no statistically significant difference in additional use of analgesia between the two groups. The frequency of use of analgesia was observed to be lower in the Tualang honey + antibiotic group compared to the antibiotic only group (Figure 4).



**Figure 2.** Pain score between Tualang honey + antibiotic group and antibiotic only group. Greenhouse-Geisser for pain versus group interaction,  $p=0.655$ , Maunchly's test  $p\leq 0.001$ .



**Figure 3.** Frequency of awakening at night due to pain between Tualang honey + antibiotic group and antibiotic only group. Greenhouse-Geisser for frequency versus group interaction,  $p=0.655$ , Maunchly's  $W$ ,  $p\leq 0.001$ .



**Figure 4.** Difference of analgesia use between Tualang honey + antibiotic group and antibiotic only group. Greenhouse-Geisser for analgesia versus group interaction,  $p=0.144$  Maunchly's  $W$ ,  $p\leq 0.001$ .

## DISCUSSION

In this study the effect of Tualang honey on post-tonsillectomy pain was evaluated by assessing the pain score, frequency of awakening at night and additional analgesia requirement. Pain was assessed using ten points of VAS for children of more than seven years and facial pain scale for patients less than seven years old. The visual analog scale is easy to use, simple to register and easily understood by the children. The assessment was done and documented by their parents. According to Myles et al.,<sup>[16]</sup> the VAS is a unimodal measure of pain intensity and cannot adequately represent all aspects of pain perception. The extremes of 'no pain' and 'worst pain you can imagine' might not truly represent absolute limits of perception. Despite these limitations it remains as a widely used, validated measure of pain. They suggested that VAS could be used in postoperative patients with acute mild to moderate pain, such as in post-tonsillectomy patients.

In the current study, the results showed that there was no significant difference in post-tonsillectomy pain between the two study groups. However in the Tualang honey + antibiotic group, the score was less than in the antibiotic

only group from postoperative day 1. The total pain score reduced gradually from day 1 to day 7 postoperatively in both groups. The antibiotic only group exhibited much higher scores in the early postoperative period. We postulated that this could be due to the soothing effects of topical application of honey intraoperatively. By day 6-7 postoperatively, all pain scores were zero in both groups which could be explained by healing of tonsillar fossae with time. After day 14, most of patients showed complete healing of both tonsillar fossae. Since there is no study that we know of to date with a similar investigation, it is difficult to compare these results with the findings from other researchers.

In the current study, although the antibiotic only group showed slightly higher pain scores from day 1 until day 5 postoperatively, there was no significant difference in pain experienced over time between the two study groups. Ozluedik et al.,<sup>[11]</sup> has shown that oral administration of honey following pediatric tonsillectomy had relieved postoperative pain and decreased the need for analgesia. This finding is in contrast to the findings from the present study.

There are several possible reasons to explain this contradiction. In the present

study, the patients in both groups received the same regimen of antibiotic. There is no doubt that the use of antibiotic could help to reduce infection and inflammation with subsequent reduction in pain. Mutiso et al.<sup>[17]</sup> has shown that a single dose of antibiotic (co-amoxiclav) reduced postoperative pain by reducing inflammation. Therefore, regardless of the effect of honey, patients in both groups could have experienced the same pattern of reducing trend of pain over time.

Also, there is a possibility that the current study employed too small number of patients even though the number adheres to the requirement as calculated in the sample size. A larger sample size could possibly show significant difference in pain outcomes. The frequency of pain could also be measured as another variable. Twice daily assessment of pain, for example one in the morning and one at night could be included in the pain score and could result in significant difference between the two groups.

Pain experienced by the patients would differ from person to person based on many factors such as personal pain threshold, underlying medical illness and psychosocial factors.<sup>[18]</sup> In the present study, majority of children experienced moderate to severe postoperative pain. The results showed that children experienced high levels of pain at day 3 post-surgery. It has been found that pediatric patients experienced pain even after minor operations and postoperative pain lasted longer for weeks if they had undergone major surgery.<sup>[19]</sup> This is in agreement with the results from the present study where there was high pain score in the early postoperative period among pediatric patients in both groups.

Pain is known to trigger stimuli that will interfere with sleeping. By measuring the frequency of awakening at night, the degree and level of pain could be estimated. While it does not precisely measure the degree of pain, it gives an approximate level of pain that could be recorded and evaluated. In the present study, the frequency of awakening at night was evaluated as an additional measure of level of pain experienced by children. The Tualang honey + antibiotic group had a lower frequency of awakening at night compared to the antibiotic only group. The consistency of this result could

not be compared with any previous study since there was no similar study done. Physically, honey has a soothing effect on the mucosa; this could contribute to the mechanism of lower frequency of awakening at night time in the present study.

The use of postoperative analgesia is an important indicator of pain experienced by the patients. By consuming the analgesic, patients imply that they are experiencing pain and need some form of remedy to alleviate this pain. By measuring the dose and frequency of the analgesia taken by patients, the degree of pain and residual pain could be assessed. The consumption of analgesia would depend on several factors such as tolerance for the taste of medications, pain threshold, knowledge about the available analgesia, fear of taking medication and awareness by nurses of the patient being in pain. In this study the results showed that there was no significant difference in the postoperative consumption of analgesia between the two study groups.

In conclusion Tualang honey did not show a significant effect in reducing post-tonsillectomy pain. However, early postoperative pain was relieved slightly faster in the Tualang honey + antibiotic group and may be due to the soothing effects of honey. In addition, honey is convenient to use topically, safe to consume orally and readily available locally.

#### **Declaration of conflicting interests**

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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#### **REFERENCES**

1. Bleach N, Milford C, Hasselt AV. Operative Otorhinolaryngology. Chapter 42. Oxford: Blackwell Science Ltd; 1997. p. 295-300.
2. Von Baeyer CL. Measurement and assessment of paediatric pain in primary care. In: Walco GA, Goldschneider KR, editors. Pain in children: a practical

- guide for primary care Totowa: Humana Press; 2008. p. 21-7.
3. Kim DY, Rah YC, Kim DW, Kim SW, Han DH, Kong IG, et al. Impact of tonsillectomy on pediatric psychological status. *Int J Pediatr Otorhinolaryngol* 2008;72:1359-63.
  4. Stelter K, Hiller J, Hempel JM, Berghaus A, Hagedorn H, Andratschke M, et al. Comparison of two different local anaesthetic infiltrations for postoperative pain relief in tonsillectomy: a prospective, randomised, double blind, clinical trial. *Eur Arch Otorhinolaryngol* 2010;267:1129-34.
  5. Lavy JA. Post-tonsillectomy pain: the difference between younger and older patients. *Int J Pediatr Otorhinolaryngol* 1997;42:11-5.
  6. Ernst E, Fialka V. Ice freezes pain? A review of the clinical effectiveness of analgesic cold therapy. *J Pain Symptom Manage* 1994;9:56-9.
  7. Freeman SB, Markwell JK. Sucralfate in alleviating post-tonsillectomy pain. *Laryngoscope* 1992;102:1242-6.
  8. Sertel S, Herrmann S, Greten HJ, Haxsen V, El-Bitar S, Simon CH, et al. Additional use of acupuncture to NSAID effectively reduces post-tonsillectomy pain. *Eur Arch Otorhinolaryngol* 2009;266:919-25.
  9. Dhiwakar M, Clement WA, Supriya M, McKerrow W. Antibiotics to reduce post-tonsillectomy morbidity. *Cochrane Database Syst Rev* 2012;12:CD005607.
  10. Lombard B, Tomasi M, Charpentier P, Drouet Y, Salgas P. Evaluation of transcutaneous electrostimulation in the management of post-tonsillectomy pain in adults. *Rev Laryngol Otol Rhinol (Bord)* 1996;117:89-92.
  11. Ozlugedik S, Genc S, Unal A, Elhan AH, Tezer M, Titiz A. Can postoperative pains following tonsillectomy be relieved by honey? A prospective, randomized, placebo controlled preliminary study. *Int J Pediatr Otorhinolaryngol* 2006;70:1929-34.
  12. Ghazali FC. Morphological characterization study of Malaysian honey. *Annals of Microscopy* 2009;9:93-101.
  13. Tumin N, Halim AN, Shahjahan M, Noor Izani NJ. Antibacterial activity of local Malaysian honey. *Malay J Pharm Sci* 2005;3:1-10.
  14. Nasir NA, Halim AS, Singh KK, Dorai AA, Haneef MN. Antibacterial properties of tualang honey and its effect in burn wound management: a comparative study. *BMC Complement Altern Med* 2010;10:31.
  15. Khalil MI, Alam N, Moniruzzaman M, Sulaiman SA, Gan SH. Phenolic content and anti oxidant capacity of Malaysian Tualang honey. *Journal of ApiProduct and ApiMedical Science* 2010;2:31-60.
  16. Myles PS, Troedel S, Boquest M, Reeves M. The pain visual analog scale: is it linear or nonlinear? *Anesth Analg* 1999;89:1517-20.
  17. Mutiso MD, Macharia IM. Single intraoperative intravenous Co-Amoxiclav versus postoperative full oral course in prevention of postadenotonsillectomy morbidity: a randomised clinical trial. *BMC Ear Nose Throat Disord* 2011;11:9.
  18. Crandall M, Savedra M. Multidimensional assessment using the adolescent pediatric pain tool: a case report. *J Spec Pediatr Nurs* 2005;10:115-23.
  19. Salanterä S, Lauri S, Salmi TT, Aantaa R. Nursing activities and outcomes of care in the assessment, management, and documentation of children's pain. *J Pediatr Nurs* 1999;14:408-15.