Treatment of Partial Thickness Burn Wounds Using Tualang Honey, Hydrofibre and Silver Dressings: A Pilot Study

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Summary

The objective of this study was to compare the clinical aspect of the healing properties of honey in partial thickness burn wounds to those treated using hydrofibre or silver dressings. A randomized, non-blinded prospective study of burn patients treated with hydrofibre impregnated with tualang honey, plain hydrofibre and hydrofibre silver treated at our burn unit was made. Clinical evaluation and photo documentation during each dressing change were recorded and analysed. The pilot study consisted of 50 out of a targeted sample population of 60 patients. The average time for epithelization for wounds treated using hydrofibre and tualang honey was 18 days, in comparison to 21 days for hydrofibre silver and 12 days for hydrofibre alone. The mean number of dressing changes was 5 for patients treated using hydrofibre honey, 4 for hydrofibre alone and 6 for hydrofibre silver. Patients tolerance to pain during dressings was equal among all groups of dressing materials with some patients complaints of burning sensation at wound sites following dressings with honey. Five percent of wounds treated with tualang honey showed greenish or yellowish discharge during initial dressings and became clean later, while the remaining area of the wound was clean throughout the treatment course. The mean length of hospital stay was 5, 3 and 10 days for hydrofibre and tualang honey, hydrofibre alone and hydrofibre silver, respectively. As a recommendation, future studies on this subject with a bigger sample size are required to further validate the findings. Honey is considered to be a suitable option to replace the other modern dressings in treating partial thickness burn wounds because of it is antibacterial properties, its high osmolarity and it is rich in nutrients.

Keywords: Tualang honey, burn, hydrofibre, silver dressings, hydrofibre silver, prospective study, partial thickness burns.

Introduction

Honey has been recognized as a medicinal tool since ancient times. It has been applied to hasten the healing of ulcers, infected wounds and burn (Bergman et al., 1983). Studies on the healing properties of honey also demonstrates that it inhibits the growth of Gram-positive and Gram-negative organisms while promoting epithelialization of the wound (White et al., 1963; Efem, 1988). Burn injury has been known to be one of the main reasons for hospital admissions world wide and is a time, labour and money consuming affair. It is accompanied by complex pathophysiological mechanisms that exert effects on various organ systems. Between the variance of burn injury, partial thickness burns are among the most frequently occurring injuries. Most of the dressing materials available nowadays to treat burn wounds are costly and not naturally produced while usage of antibiotics are limited by the mechanism of bacterial resistance. Tualang honey is obtained from the Tualang tree (Koompassia excelsa) (Nasir, 2010). It has been shown to have potential in treating burn wounds (Tan, 2009). Tualang honey has long been established as a medicinal tool in Malaysia ( Ainul Hafiza, et al., 2005). Even though commonly used and relatively inexpensive, Tulle gras, gauze and hydrofibre based dressings may not have the
desired antibacterial effect on burn wounds. Thus, silver dressings like hydrofibre silver or Acticoat are frequently used in managing burn wounds. Hydrofibre silver particularly contains hydrofibre as well as antibacterial silver (Caruso, 2004). This study was designed as a randomized trial to compare the clinical aspect of using honey and silver dressings in partial thickness burn wounds, with plain hydrofibre dressings as the control. The rational for using two antimicrobial agents in this study, honey and hydrofibre silver, lies in the fact that although these two types of dressings present excellent options for burn wound dressings, the relative costs and healing properties can be judged. The hypothesis of the study was that tualang honey is better than silver dressings in treating burn wounds.

**Materials and methods**

Fifty burn patients were included in this study over the period from May 2005 to July 2008. They attended our unit with partial thickness burns and were treated within 24 hours of the injury. The inclusion criteria were patients with partial thickness burn wounds, a burn area of <30%, consented patients and subjects must be expected to survive and patients with no severe co-morbidities or on long term immunosuppressive agents. The approval of the Ethical Committee was obtained prior to starting this study. After the initial assessment, the patients were divided at random into three groups. The final study design required each dressings material to be applied to 30 patients each (n=30). In Group 1 (n = 17) tualang honey (Fig. 1) was spread evenly onto a hydrofibre dressing before being applied to the wound surface, after cleaning the wound with chlorhexidine and saline solutions (Fig. 2,3,4). In group 2 (n = 21), plain hydrofibre was applied on the wound as a hydrofibre dressing while in group 3 (n = 12).
Hyfrofibre silver was applied to the surface of the wound. In each group, after applying the respective dressing material, the wound was covered with sterile gauze and bandaged. Dressings were later performed on alternate days, and at the time of dressing the clinical appearance of the wound, including any presence of pus and evidence of epithelization and patients tolerance to pain were observed. Each wound was photographed during each session. At the time of full epithelization of the wound, the total number of dressing changes as well as the length of hospital stay were documented. The results were recorded using a proforma and later analysed. However, no statistical calculation was performed as this is a preliminary study with limited sample size. Figures 5 - 7 show each application of dressing material on the burn wounds and the outcome after complete epithelization with three patients.

Results

Of the 50 patients 26 were male and 24 female. Their age ranges from 6 months to 63 years old; thirty-one patients were less than 10 years old, eleven of them between 10 to 40 years and eight were more than 40 years old. The burn surface area ranged from less than 1% to 15% Total Body Surface Area (TBSA). The mechanism of injury was mainly due to scalds and flash burns. No injuries were from chemical or electrical burns. Twenty six patients had a superficial dermal burn and the remaining sustained a deep dermal burn; ten patients underwent operation during their course of treatment.

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silver and 12 days for hydrofibre. The mean number of dressing changes was 5 for patients treated using hydrofibre honey, 4 for plain hydrofibre and 6 for hydrofibre silver. Patients tolerance to pain during dressings were good and equal among the three group of dressing materials, except that some patients complained of burning sensation at wound sites following dressings with honey. Five percent (5%) of wounds treated with tualang honey showed greenish or yellowish discharge during initial dressings and became clean later on, the remaining of the wound was clean throughout the treatment course. The mean length of hospital stay was 5, 3 and 10 days for hydrofibre and tualang honey, hydrofibre and hydrofibre silver respectively.

Discussion
Honey as a medicinal tool has been recognized since ancient times. Recently, there has been a rapidly increasing interest in the use of honey in wound dressing. The prospect of utilizing honey in treating partial thickness burn wound is very tantalizing in view of its relative lower cost and fewer side effects in comparison to conventional dressing materials. Hydrofibre is a textile fibre dressing composed of sodium carboxymethylcellulose. It can be impregnated with silver to form the silver-based hydrofibre silver. Burn wounds initially are sterile, however by taking into account that some of the initial dressings may be done on an outpatient basis, the probability of infection is high, hence the usage of antimicrobial agents in this study. We wanted to see the clinical aspect of burn wound healing of tualang honey versus hydrofibre silver. The assessment of resolution of infection were made based on the initial and subsequent appearance of the wounds, the length of hospital stay, the number of dressing changes and the level of discomfort during dressing change for each of the materials.

In this pilot study, the results suggested that honey was superior to silver-based dressings in time needed for wounds to fully epithelize. The result also show a lower mean number of dressing changes and total length of hospital stay for the patients in between these two groups.

This may be attributed to the capability of honey to enhance the rate of histological reparative ability (Subramaniyam, 1991). Prior research of honey also demonstrated that it can inhibit the replication of major wound-infecting species of bacteria (Willix et al., 1992). This antibacterial effect is postulated to be due to the presence of hydrogen peroxide, generated by the action of an enzyme that the bees add to nectar (White, 1963). Another important property of honey that enabled it to act as an antibacterial agent is its high osmolarity. As a result of this, the water molecules are tightly bound to sugar molecules rendering insufficient water supply to the bacteria to support their growth (Chirife, 1982).

The findings of less dressing changes and less total length of hospital stay for patients dressed with honey compared to silver dressings complemented claims of anti-inflammatory activity (Molan, 1999). Honey has also been demonstrated to decrease oxidative stress by mopping up the free radicals arising from burns (Subramaniyam, 1998). Another explanation for less number of dressing changes for honey is the fact that it creates a moist environment by drawing exudates to the surface of the wound, hence creating a non-adherent layer between the dressing and wound bed.

There have been reports in the literature that honey causes pain during dressing which correlates with our findings. Patients on honey dressings were noted to have more pain during dressing sessions compared to the other groups of dressing materials. An origin of the pain may be due to the stimulation of nociceptors by honey (Al-Swayeh, 1998). Nonetheless, this pain did not seem to exert harmful effects to the surrounding tissue around the wound or
the wound itself.

In our series, the overall healing time and wound appearance for wounds dressed with hydrofibre alone showed better results compared to honey and hydrofibre silver. This may be attributed to uneven distribution of patients as total number of patients dressed using hydrofibre exceeded those of the other two groups. Future studies with larger sample size with similar number of patients and severity of wound may yield more favourable result towards honey dressings. With bigger sample population, relevant statistical investigations can also be applied to further validate the results.

As a conclusion, the usage of tualang honey as dressings material for burn patients showed superior result compared to hydrofibre silver in relation to the rate of wound healing. The high osmolarity and high-nutrient content may have accelerated the cleansing and desloughing of dirty wounds and promoted epithelization and angiogenesis. It is also cheaper when compared with the other single dressings: a 10 cm x 10 cm Silver dressings will cost €4.67, the same sized plain hydrofibre will cost €3.56, whereas a single dressing session using 10 cm x 10 cm of tualang honey will only cost €0.31cents. Therefore as a natural product, honey provides us with a cheaper and readily available alternative to modern materials.

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