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Review Article

The Authenticity of Honey (*Apis mellifera*) Playing Vital Role in Wound Healing

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ABSTRACT

To facilitate the healing process of skin wounds, honey is considered beneficial. It is involved in platelet aggregation inhibition, myocardial infarction, tumour genesis, inflammatory cytokine development, oxidative process, and metastasis. The skin serves as a body's protective barrier. It protects the internal organs of the body from the effects of external environmental conditions. They may be in danger in such situations. As a result, maintaining the integrity of the skin is critical for normal body function. In everyday life, both animal and human bodies are subjected to various forms of aggression. Some of them are so powerful that they disrupt the skin's continuity. A wound is defined as a break in the skin's continuity. Inner body organs are revealed whenever the skin's continuity is disrupted. This is a dangerous condition that can lead to death. The immediate skin reaction after a wound is the start of the wound healing process, and it starts automatically. This process can be aided in a variety of ways by keeping the wound free of bacterial infection and moisture and dirt. A variety of antiseptic dressings are available for this purpose, and when applied topically, they aid in the wound healing process. They keep microorganisms out of the wound and cut down on the time it takes for it to heal. It has potent wound-healing properties. The focus of this study is to summarise the findings of previous researchers, concluding that herbal medicines are safe, easily accessible, and less expensive to use (Honey).

Keywords: *Honey, Herbal medicine, Wounds Healing.*

INTRODUCTION

A wound is a trauma-induced injury, particularly one that affects an animal's skin and flesh. In surgery, the term wound refers to a solution of continuity or interruption of the soft part of the body due to external trauma, but in medical terms, it refers to an injury to any part of the body caused by an agent as a result of external trauma, regardless of whether the surface is broken or not (Buffoni et al., 1993).

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Wounds have been covered with a variety of materials since the dawn of recorded history. Since 2000 BCE, Egyptian papyruses have been used to treat wounds with poultices made of mud, milk, and plants, and between 1550 and 1650 BCE, they provide details on how to prepare the wound and add plasters made of honey, plant fibers, and animal fat, before bandaging the wound (Majno, 1975). More than 80% of the world's population still uses traditional medicines to treat their ailments (Kumara et al., 2001).

Honey has been shown to aid wound healing through a variety of mechanisms. By drawing lymph into the wound, promotes a moist wound environment and prevents the dressing from adhering to the wound bed (Gunes et al., 2007). Honey-contained laevulose and fructose can also help to develop local nutrition and epithelialization. Honey is naturally acidic, and fibroblast activity creates an ideal environment for it to thrive. Honey has been shown to promote healthy granulation tissue by causing angiogenesis, which increases oxygen and wound nutrients. It also hastens epithelialization, reducing the need for skin grafting, and stimulates collagen synthesis, and improves tensile strength (Molan, 2002).

Honey has been used to treat wounds and other skin conditions for a long time (Harris, 1994). It helps wounds with mild to moderate shallow and partial thickness burns heal faster (Jull et al., 2008). Honey applied topically can increase the thickness of granulation tissue and the surface of re-epithelization, as well as improve collagen metabolism during wound healing (Bangroo et al., 2005 & Suguna et al., 1992).

IMPACTS OF HONEY ON WOUND

Molan (1998) investigated the use of honey as a wound dressing material, a rediscovered ancient remedy whose popularity has grown as more reports of its efficacy have been published. The infection is rapidly removed, inflammation, swelling, and pain are rapidly reduced, the odour is reduced, necrotic tissue sloughing is caused, granulation and epithelialization are accelerated, and healing occurs quickly with minimal scarring. Honey's antimicrobial properties prevent microbial growth in the moist healing environment it creates. Honey, unlike other topical antiseptics, does not cause tissue damage in animal tests; in fact, it has been shown histologically to aid in the healing process. Osmosis pulls the lymph out of the cells and has a direct nutrient effect. Honey's acidity may also contribute to the calming effect. When osmosis comes into contact with the wound surface, it produces a honey solution that prevents the dressing from binding, resulting in no discomfort or tissue damage after dressings are changed. Honey is more beneficial for the treatment of burns than silver sulfadiazine and a polyurethane film dressing (OpSite®) according to randomized controlled clinical trials.

Moore et al. (2001) used a systematic review of randomized controlled trials to look at topical honey in superficial burns and wounds. I was a participant in seven randomized controlled trials. Burns that are superficial, partial-thickness burns, and mild to severe burns with complete burns thickness injury and postoperative wound infection are all examples of burns that are superficial, partial-thickness burns, and mild to severe burns with complete burns thickness injury and postoperative wound infection. Honey-written articles were used as a comparator in randomized controlled trials. To avoid an outcome related to wound healing time or infection rate, the main findings were relative advantage and number-needed-to-treat. In one study, honey was put up against antiseptics and systemic antibiotics in infected postoperative wounds. When compared to antiseptics, 299 grams of honey were required for good wound healing (95 percent confidence interval 1.7 to 9.7).

Less than 40% of the body surface was covered in five trials of patients with partial-thickness or superficial burns. Polyurethane film, amniotic membrane, potato peel, and silver sulphadiazine were used as comparisons. In comparison to all other treatments, the number needed to treat one

patient with a cured burn for seven days with honey was 2.6 (2.1 to 3.4) and 2.7 (2.0 to 4.1) for potato and amniotic membrane, respectively. Honey was equivalent to any or all of these therapies for any or all outcomes. Honey's recovery time was much faster than any of the other treatments. Honey's effectiveness as a treatment for superficial injuries or burns is dubious.

Rozaini et al. (2004) used 105 male Sprague-Dawley rats to test the effects of different types of honey on the tensile strength of burn wound tissue healing. The rats were divided into seven groups of fifteen rats each at random. Rats were anaesthetized and wounds were created using cylindrical aluminum templates heated in a water bath for 3 hours at a constant temperature of 85 ° C. Honey (0.5 ml) collected from various vegetation was applied to rat wounds 30 minutes after the skin was burned in five of the classes. In one group, silver sulfadiazine cream was applied to positive controls, while untreated controls were served. The rats were euthanized three, seven, fourteen, twenty-one, and twenty-eight days after the burns appeared. The tensile strength of the test areas was measured using a universal measuring machine after they were separated from the skin in strips. In general, tensile strength values have risen over time. Except on Day 21, the skin treated with Manuka honey had a higher tensile strength throughout the study. In terms of tensile strength, this experiment revealed that applying honey topically to burn wounds improved healing.

John et al. (2005) compared abscess wound healing with either raw undiluted honey or a University of Edinburgh lime solution (EUSOL). In two randomized treatment classes, both participants had a fresh surgical incision and abscess drainage, as well as a 21-day course of ampicillin pluscloxacillin (Ampiclox) and gentamycin; the wounds were left to spontaneously close with twice-daily wound dressing and either honey- or EUSOL-soaked gauze packaging of the abscess cavity. On days 1, 3, 7, and 21, the clinical conditions of the wound sites were reported as clean, dry, or wet, with granulation tissue present or absent, and epithelialization present or absent, as well as the length of hospital stay. The following are the outcomes: Honey-treated wounds healed faster, and patients with honey-treated wounds spent significantly less time in the hospital than those treated with EUSOL (t 2.45, p 0.019). Final Thoughts: EUSOL's superior wound dressing agent is honey. Honey is recommended for the treatment of infected wounds, especially in tropical countries where it is most readily available.

Demir et al. (2007) investigated the effects of topical honey on diabetic wound healing in mice. Twenty-seven Swiss mice were used in the study in which streptozotocin was used to induce diabetes. On both sides of the animals' backs, full-thickness defects measuring 1 cm in diameter were created. The experimental group consisted of defects on the left side, while the control group consisted of defects on the right side. Honey was used to treat the wounds on the left side, while isotonic sodium chloride was used to treat the wounds on the right side. On days 3, 6, and 9, the mice were sacrificed. The thickness of the granulation tissue and the distance from the usual skin edge to the wound protected by epithelization was measured histopathologically in both wounds. The wound areas were assessed using 3D-DOCTOR (Trial Edition, Able Software Corp., USA) software. A paired-sample-t-test was used for analysis. The wound area was slightly smaller and the progression of epithelization was significantly greater in the honey-treated region when compared to the control region of the same species, but there was no significant difference in the thickness of the granulation tissues. This study demonstrates that topical application of honey improves wound healing in diabetic mice by facilitating wound contraction and epithelization.

Jull et al. (2008) investigated honey's properties. Honey is a viscous, supersaturated sugar solution made from nectar collected and modified by Apis mellifera, the honeybee. Honey has been used to treat wounds since the

dawn of time. Honey has been shown to hasten the healing of wounds in animal studies and some human studies. The goal was to see if honey can speed up the healing of both acute and chronic wounds (burns, lacerations, and other traumatic wounds) (venous ulcers, arterial ulcers, diabetic ulcers, pressure ulcers, infected surgical wounds). We looked at the Cochrane Wounds Group's Specialist Registry (May, 2008), CENTRAL (May, 2008), and a few other electronic databases (May, 2008). Bibliographies were scanned, and manufacturers of dressing goods were contacted for unpublished experiments. Honey as a treatment for any type of acute or chronic wound was sought in randomized and quasi-randomized studies. There were no restrictions on source, publication date, or language. The most important result was wound healing. One author used a data extraction sheet to extract and summarise data from qualifying trials, and a second author independently confirmed 19 trials (n=2554) that met the inclusion criteria.

Three trials looked at the effect of honey on acute lacerations, abrasions, or minor surgical injuries in acute wounds, and nine trials looked at burns in acute wounds. Honey's effect on venous leg ulcers in chronic wounds was studied in two studies, one on pressure ulcers, infected post-operative wounds, and Fournier's gangrene, and the other on pressure ulcers, infected post-operative wounds, and Fournier's gangrene. Two studies enlisted participants with a mix of chronic and acute wound types. Except for venous leg ulcers, the findings should be viewed with caution due to the low standard of most trial reports. Honey can speed up the healing process in acute wounds when compared to some traditional dressings in partial-thickness burns (WMD -4.68 days, 95 percent CI -4.28 to -5.09 days). All of the burns studies were conducted at a single location, which could affect replicability. Honey does not significantly improve the healing of venous leg ulcers in chronic wounds when used in conjunction with compression bandaging (RR 1.15, 95 percent CI 0.96 to 1.38). There is insufficient evidence to evaluate the impact of honey on burns or other acute or chronic wound forms when compared to other therapies.

Zinc supplementation improves the healing of open wounds, according to Sazegar et al. (2010). By supplementing normal rats with zinc, the wound's tensile strength can be improved. The goal of this study is to look at the effects of zinc and honey on natural wound healing in rats. One hundred and seventy-two young rats were randomly assigned to one of four groups: power, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc-supplement, honey applied, zinc- A total of four centimeters of skin were removed. Every two days, the wound area was measured. All of the animals were killed after 3 weeks, and the tensile strength of the wounds, the zinc concentration in the blood, and the histological improvement of the wounds were all assessed. The findings were evaluated and the mean differences were checked using two-way ANOVA. Honey was discovered to inhibit bacterial growth in skin excisions.

On the 21st day, the tensile strength of the second to fourth groups significantly improved (P0.001). At the same time, a tensile strength in the fourth category increased dramatically. Collagen fibers, re-epithelialization, and re-vascularization all increased significantly in the second to fourth classes, according to the histological analysis. The results of this study suggest that zinc sulfate, when combined with natural honey, can delay re-epithelialization while also improving wound healing in non-zinc deficient subjects.

Nisbet et al. (2010) compared the effects of three different types of honey on full-thickness wound healing (chestnut, blossom, and rhododendron). The experiment used a total of twenty-four (24) white female rabbits from New Zealand. On each animal's back, four 1.5 cm x 1.5 cm full-thickness skin wounds were created and treated with either pure honey or sterile saline. To determine the healing process, wound measurements and

sample selection were taken at 7, 14, and 21 days after injury. The hydroxyproline concentration, as well as gross and microscopic morphological features indicative of wound healing, were all variables of interest. The honey-treated groups healed wounds much faster than the control group.

On day 7, the honey-treated groups had more granulation tissue development, epithelization, angiogenesis, and fibroplasia than the control groups (P 0.05). There was no statistical difference between the kinds of honey described. According to the current findings, honey appears to speed up the inflammatory response and initiate healing early in the treatment process.

Iftikhar et al. (2010) in a variety of rat models, investigated the effects of Acacia honey on wound healing. The rats were handled both as topically and orally, with a variety of honey combinations used. An increase in wound contraction, tissue granulation, skin breaking potency, and collagen production caused the surface of epithelization to increase. Wound healing is improved by both low and high honey doses. In comparison to controls, the hydroxyproline substance has increased in animals given higher honey doses.

According to Muhammad et al. (2010), forty samples of different honey types (Acacia, Ziziphus, Brassica, and Citrus) were collected from different areas of Pakistan and analyzed for moisture, pH, total acidity, ash, electrical conductivity, hydroxymethyl furfural (HMF), sucrose, total sugars, invert sugar, protein, proline, and macro and microelements. Because of the various types of flora, there was a variation in the composition of honey samples. Ziziphus honey had a higher pH (6.56 0.05), acidity (45.0 2.35 mg/kg) than Citrus, moisture (36.8 1.8 percent) than Brassica, and HMF (32.7 0.49 mg/kg) than Acacia. Proline (2.1 0.04 mg/kg) and invert sugar (0.38 mg/kg) concentrations were higher. Citrus honey had a low protein content (0.1 percent) and Acacia honey had a high protein content (16.5 1.5 g/100g). Similarly, ash, electric conductivity, sucrose, and total sugar as well as a significant level (P 0.05) of ash, electric conductivity, sucrose, and total sugar, as well as These honey types, contained macro and microelements as well. Distinctive The growth of pathogenic microorganisms was significantly inhibited by honey formulations. When it comes to Staphylococcus aureus, E. coli, Candida albicans, and Aspergillus niger, compared to the control group, indicating that honey is being used as a therapeutic agent Since antiquity, all over the world.

Ali et al. investigated the effects of Teucrium polium honey on wound healing and tensile strength in rats (2011). Wound healing is a complex physiological process influenced by a variety of factors. Thirty-six Sprague-Dawley rats (n=9) were divided into four equal care and control groups. According to the incision and excision models, two full thickness wounds were made over the dorsal thoracic region. The animals were given Teucrium polium honey twice a day after surgery until they healed completely. After that, they learned histopathology and tensiometry. In the incision model, wound healing was faster than in the excision model (P 0.05). Teucrium polium honey improved wound contraction, time to closure, and tensile strength (P 0.05). Increased epithelial proliferation, angiogenesis granulation, and fibrous connective tissue were found in animals treated with Teucrium polium honey in histopathological studies. According to a new study, Teucrium polium honey can speed wound healing and increase tensile strength in rats.

Christopher et al. (2012) compared wound healing results between Chromolaena (Eupatorium) Odaratum (C. Odaratum) and unpasteurized, filtered honey. Honey has wound-healing properties. However, there isn't much evidence about C. Odaratum's wound-healing abilities. Affirmation Control group A, experimental groups B, C, and D, a total of 40 adult male rats, were divided into four equal groups. On the dorsolateral flanks of their right body, a recognized wound dimension was

placed. The wounds of the animals in control group A were dressed in regular saline, whereas the wounds of the animals in experimental groups B, C, and D were dressed in honey, hydrophobic portion C. Odaratum, and part of C hydrophilic. Odaratum, to be precise. Every three days, the size of the wound was calculated. The percentage of wound contraction on day 6 was calculated using the following formula: wound size on day 1, minus wound size on day 6, divided by wound size on day 6; the product is then multiplied by 100; the same method was used to calculate the percentage of wound contraction on day 9. Days 6 and 9 had statistically significant differences in P values of P0.058 and P0.263, respectively. On day 9, wound biopsy was performed on five animals from each group at random to histologically access granulation tissue. When the wounds healed, the final scar tissue was harvested from the five remaining animals in each group for histological and histopathological examination. A standard laboratory procedure was followed to prepare the slides.

Repithelialization, the development of granulation tissue, scar formation, and contraction resulting in a reduced amount of scar tissue are all obvious conditions for successful wound healing. The control group A exhibited almost all of these characteristics, with only a minor attempt at skin appendage formation. Experimental Group B demonstrated all of these, as did control group A; normally developed skin appendages, but wound contraction had been postponed. All of the properties seen in the control group were also seen in the experimental group C; A; Wound contraction was also faster. Experimental group D showed all of the parameters, while control group A made only a limited attempt at epithelial cell formation. The findings of this study could be enough to suggest that C. Odaratum hydrophobic is effective in wound healing.

CONCLUSIONS

Wound healing is an intricate process in which after the injury the skin or other body tissues repair themselves, but sometimes healing can fail at any stage due to interruption. There are several factors that can delay the wound healing process, such as anemia, diabetes, nutritional deficiency, hematoma, local infections, etc. In the treatment of wounds, many medicinal plants and other herbal immunomodulators such as honey, Neem leaves, turmeric, aloe vera, etc, are considered useful. Honey wound healing is cheap, affordable, and healthy because it has no side effects. Via different pathways, these herbal ointments promote healing and regeneration of the lost tissues. There is, however, a need for scientific evaluation, standardization, and safety assessment of these herbal ointments.

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