

**ORIGINAL ARTICLE**

**THE EFFECT OF GIVING HONEY ON THE PROCESS OF WOUND HEALING IN BURNED PATIENTS**

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**ABSTRACT**

**Background:** Burns are one of the most dangerous injuries and the main cause of disability to death. Burns can be interpreted as one of the serious problems in society and are recorded to cause around 265,000 deaths each year. Honey can maintain the wound condition to keep it moist and in high viscosity to prevent infection.

**Method:** This study was conducted to determine the effect of honey on the wound healing process in burn patients. This study uses a literature review method. The population in this study is a journal with a background in the health sector with 10 international journals on burns with the qualifications of 9 SCIMAGO indexed journals and 1 SINTA indexed journal published from 2015 to 2020.

**Results:** Burns that treated in the form of pure honey can generate good results and heal in an average of 20 days. The healing process will be better, if the wound given a mixture of other ingredients which also have a low acidity such as garlic, chitosan and beeswax and olive oil. Honey has antimicrobial properties and a low pH level. The microbe most sensitive to honey is *Staphylococcus aureus*.

**Conclusion:** The conclusion from this study, honey can be used as an alternative treatment for burns.

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**INTRODUCTION**

Burns are defined by the World Health Organization (WHO) as tissue injuries to the skin caused by heat, radiation, electric shock, radioactive materials and contact with hazardous chemicals. Skin damage caused by ultraviolet (UV) rays and disturbances in the respiratory system caused by inhaling too much smoke can also be categorized as burns. Burns are one of the most dangerous injuries and the leading cause of limb disability and death. According to the World Health Organization (WHO), burns can be interpreted globally as one of the serious problems. Fire cases that have been recorded in the world occur around 265,000 deaths each year. The number of deaths due to burns is something that needs to be considered in every country. Millions of burn victims who survived the disabilities in their bodies were rejected from their

neighborhoods<sup>1</sup>.

Topical antibiotics that can treat wounds in humans and animals are very important to find<sup>2</sup>, but to prevent antibiotic resistance, alternative medicine can be used to heal burns<sup>3</sup>. A long history explains that honey is an ingredient that can treat wounds. Since ancient times, honey has been used for its nutritional and therapeutic effects. Honey can be used as a sweetener and flavor in a dish. Honey is very easy to find almost all over the world. Carbohydrates are the most important nutrients in honey because they are present in the form of glucose, fructose and monosaccharides. Honey contains nutrients that can act as anti-inflammatory, antioxidant and anti-bacterial agents so it is good for the healing process of wounds on the skin. In scientific literature, the function of honey has been to prevent coughing, increase fertility and wound healing because it has

antioxidant and antibacterial properties<sup>4</sup>

Healing burns using honey still has to go through a further research process, therefore, the authors want to know the effect of honey on the wound healing process in burn patients<sup>4</sup>. With the incident in antibiotics, the use of honey can be needed again to handle medical treatment<sup>5</sup>. Seeing the many benefits of honey, therapy using honey needs to be developed, therefore the authors intend to examine the effect of honey on the healing process of burns.

## METHODS

The research design used is descriptive research. This research will explain the effect of using honey topically for the treatment and healing process of burns. The method used is literature study. The population in this study were articles about burns, wound healing processes and honey. The journals used as references come from research with backgrounds in the health sector, especially skin medicine, nutrition, pharmacology, biology and beauty. The research sample is articles that have been published by national and international journals from 2015 to 2020 at least 10 articles that explain the process

of healing burns using honey.

This research was conducted in Surabaya from April to Oktober 2020. This research get approval from the Ethics Commission for Health Research, Faculty of Medicine, Hang Tuah University.

## RESULT

Samples in this study were taken from 10 international journals with the qualifications of 9 SCIMAGO indexed journals and 1 SINTA indexed journal about the role of honey in the healing process of burns.

### Healing time

Jeffery et al., Stated that the average healing time using honey was 18.16 days<sup>6</sup>. Moustafa and Atiba's research showed that the burns treated with honey on day 24 were more closed<sup>7</sup>. According to Ait Abderrahim et al., The wound healing time using honey is about 25-27 days<sup>8</sup>. Hendy and Lister argue that treatment using honey takes 7 days<sup>9</sup>. According to Duncan et al., ALH can provide a healing time of 3 to 14 days<sup>10</sup>, whereas according to Subrahmanyam all wounds treated with honey heal within 10 days<sup>11</sup>.

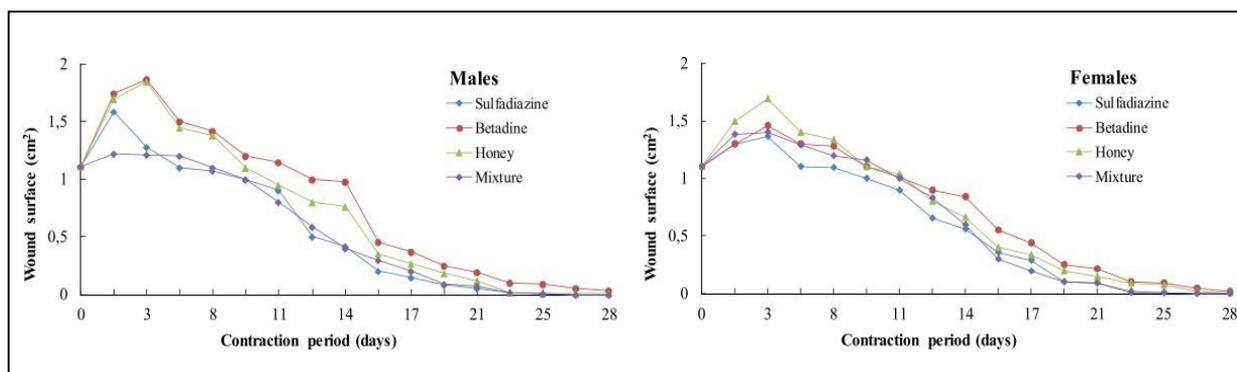


Figure 1 The green line shows the burn healing time using pure honey<sup>8</sup>

### Wound Results

Duncan et al., Reviewed facial burns, Figure 1 is a photo of 2 patients who were successfully treated with ALH honey. This process takes about 3 to 14 days<sup>10</sup>.

Jeffery et al. Observed 3 cases of burns treated with revamil honey gauze and revamil gel. The three wounds took 14-26

days to heal completely as shown in figure 2<sup>6</sup>. Smaropoulos and Cremers also observed 2 cases of burns that produced good scars within 7-18 days<sup>5</sup>.

Ait Abderrahim et al., Conducted an experiment and the burns improved within 26 days<sup>8</sup>. In addition, Moustafa and Atiba's research and Hendy and Lister's research obtained satisfactory results in the honey

group, this can be seen from the smaller burns diameter<sup>7,9</sup>.

Histologically, honey has also been shown to increase angiogenesis, this is supported by 2 literature. El-Kased et al., Observed that the layer of skin affected by burns and then given

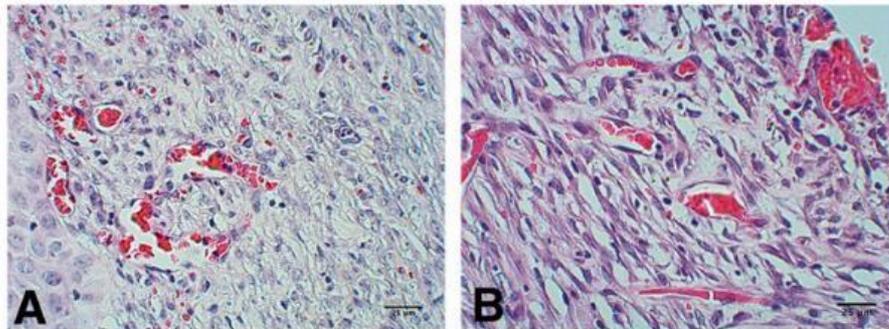
honey, on the 9th day the honey-treated skin showed few new blood capillaries and fibroblastic cell proliferation<sup>12</sup>. Furthermore, according to Schencke et al., The pure honey group experienced neoformation of blood vessels in all dermal scar tissue as shown in Figure 4<sup>13</sup>.



**Figure 2** The result of healing using ALH<sup>10</sup>



**Figure 3** Giving revamil honey gauze to blister burns<sup>6</sup>.



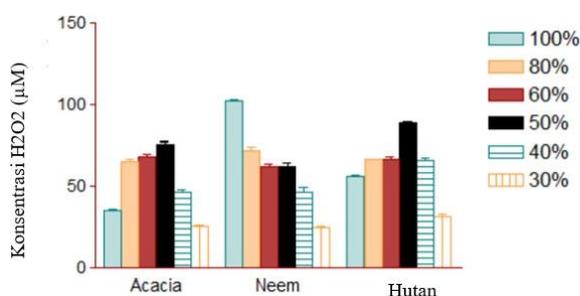
**Figure 4** Angiogenesis in honey treated skin<sup>13</sup>

**Degree of pain and patient satisfaction**

Jeffery et al., Using revamil honey gel and revamil honey gauze, from all the cases he observed, the use was very easy even though there was a little exudate but still gave satisfactory results<sup>6</sup>. Smaropoulos and Cremers also described 2 cases of burns that were observed to be easy to use and painless in all patients<sup>5</sup>. According to the Subrahmanyam study comparing honey and vaseline treated with honey, 90% experienced zero pain or only mild pain, while the group treated with vaseline gauze 88% experienced zero or mild pain<sup>11</sup>.

**Antimicrobial properties**

Duncan et al, who stated that the bacteria contained in burns were Staphylococcus aureus and P aeruginosa, besides that, according to him, there was no abnormal bacterial growth in all burn cultures in patients who were given honey<sup>10</sup>. Just like Subrahmanyam, the research results were taken on day 7 in both honey and vaseline groups and the results did not show any growth of any organisms<sup>11</sup>. According to Firdose et al., Honey has antimicrobial properties because it has a low pH and contains H<sub>2</sub>O<sub>2</sub> or peroxide acid as shown in Figure 5<sup>14</sup>. According to Ait Abderrahim et al., S. Aureus which is a gram-positive bacteria is more sensitive to honey when compared to gram- negative bacteria. such as E. coli and P. aeruginosa, whereas C. albicans was more resistant to honey<sup>8</sup>



**Figure 5.** H<sub>2</sub>O<sub>2</sub> levels in acacia honey, neem and forest honey<sup>14</sup>.

Strain	MIC
	Madu euphorbia
<i>S. aureus</i>	6
<i>E. coli</i>	9
<i>P. aeruginosa</i>	8
<i>C. albicans</i>	22

**Figure 6.** The minimum inhibition of euphorbia honey on 4 microbes<sup>8</sup>

**Cost of treatment**

According to Duncan et al., patients used between 1 to 4 tubes of product and the average cost of treatment was \$ 26.15, with a range of \$ 11.44 to \$ 45.76 or IDR 170,000 to IDR 680,000<sup>10</sup>

**DISCUSSION**

Honey can be an alternative treatment because it is easier to obtain in the village. The effectiveness of honey as a treatment for burns depends on the type of honey used, the time of administration and the degree of severity of the wound<sup>9</sup>

Honey works in the wound healing process with the presence of hydrogen peroxide which can activate macrophages to release VEGF which stimulates fibroblast proliferation and angiogenesis in wounds. Honey is able to stimulate B lymphocytes and T lymphocytes, and activate neutrophil phagocytosis in cells. Honey also stimulates monocytes (MM6 cells) to secrete cytokines, tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-1 (IL-1) and IL-6, which activate the immune response to infection. TNF- $\alpha$  secretion can be induced by protein glycosylation. Furthermore, honey is able to degrade collagen IV through stimulation of matrix metalloproteinase 9 (MMP-9), a protease enzyme that plays a role in the release of keratinocyte cells from the basement membrane, thus allowing keratinocyte migration for re-epithelialization. Honey is able to induce cytokine production by leukocytes so that it will stimulate cell growth<sup>15</sup>.

The healing time for burns using honey therapy varies from 3 to 36 days with an average of 20 days. Honey as an autolytic debridement agent is considered effective in wounds containing  $\geq 40\%$  damaged tissue. Honey creates a moist wound environment, thereby stimulating wound healing<sup>6</sup>

Honey gives satisfactory results for the healing of second degree partial burns because there is no abnormal bacterial growth, favorable patient satisfaction scores, lack of side effects and reasonable treatment costs support the use of honey as an effective, safe and economical form of treatment for burns<sup>10</sup>

## CONCLUSION

Honey is beneficial for health, especially skin because it has a low pH, contains H<sub>2</sub>O<sub>2</sub>, has antioxidant properties and has a lot of ingredients, so honey can affect the healing process of burns. Honey can be used as an alternative for the treatment of burns because it can stimulate the proliferation of fibroblasts and angiogenesis, the healing time for burns with honey is 3 to 36 days, the results of wound healing are good, honey is easy to apply, causes mild pain and is easy to get, honey has antimicrobial properties, the bacteria most sensitive to honey is *Staphylococcus aureus*. The cost of treating using ALH honey is IDR 170,000 to IDR 680,000. It is not yet known the costs involved in treating other types of honey.

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