



Possible Mechanisms of Antimicrobial Activity of Honey

Monica Tocchi *

Founder and CMO at Meditrial, Switzerland

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Mechanisms of antimicrobial activity of honey are different from antibiotics, which destroy the bacteria's cell wall or inhibit intracellular metabolic pathways. The antibacterial activity is related to four properties of honey. First, honey draws moisture out of the environment and thus dehydrates bacteria. The sugar content of honey is also high enough to hinder the growth of microbes, but the sugar content alone is not the sole reason for honey's antibacterial properties. Second, the pH of honey is between 3.2 and 4.5, and this acidity is low enough to inhibit the growth of most microorganisms. Hydrogen peroxide produced by the glucose oxidase is the third and probably the most important antibacterial component, although some authors believe the nonperoxide activity to be more important. Lastly, several phytochemical factors for antibacterial activity have been identified in honey.

Hydrogen peroxide, glucose oxidase, catalase, phytochemical factors have been described as non-peroxide antibacterial factors. In addition volatiles, organic acids, lysozyme, beeswax, nectar, pollen and propolis are important chemical factors that provide antibacterial properties to honey. Honey also contains oligosaccharides in small quantities. Shin & Ustunol related the sugar composition of honey from different floral sources to the growth inhibition of various intestinal bacteria. Moreover, it is reported that a part of the antibacterial activity might be attributed to the components of plant origin. All these physical and chemical factors give honey unique properties as a wound dressing: it has a rapid clearance of infections, rapid debridement of wounds, rapid suppression of inflammation, minimization of

scarring, and stimulation of angiogenesis as well as tissue granulation and epithelium growth.

One of the most studied and most effective uses of honey is found in healing of wounds. The Russians used honey in World War I to prevent wound infection and to accelerate wound healing. The Germans combined cod liver oil and honey to treat ulcers, burns, fistulas and boils. Nearly all types of wounds like abrasion, abscess, amputation, bed sores /decubitus ulcers, burns, chill blains, burst abdominal wound, cracked nipples, fistulas, diabetic, malignant, leprosy, traumatic, cervical, varicose and sickle cell ulcers, septic wounds, surgical wound or wounds of abdominal wall and perineum are found to be responsive to honey therapy. Application of honey as wound dressing leads to stimulation of healing process and rapidly clears the infection. Honey has cleansing action on wounds, stimulates tissue regeneration and reduces inflammation. Honey impregnated pads act as non adhesive tissue dressing.

The exact molecular mechanism of wound healing using honey is yet to be elucidated. However, several recommendations are made regarding appropriate wound dressing with honey. Type of wound and degree of severity will affect efficacy. Selected honey should be used in sufficient quantities so that it remains there if diluted with wound exudates. It should cover and extend beyond the wound margins. Better results occur when applied on dressing than on wound. All the cavities should be adequately filled with honey and occlusive dressing applied to prevent oozing from the wound. On burns, it has an initial soothing and later rapid healing effects. It has been used as wound barrier against tumor implantation in laparoscopic oncological surgery.