Wound Healing Properties of Honey-An Experimental Study

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KEY WORDS
Glucose oxidase system, Hydroscopic.

ABSTRACT

Properties that accelerate healing are noticed in Honey. It encourages early slough separation, it reduces pain and odour as well as bring about early epithelization and there by early wound healing. Experimental study carried out on 36 albino rats is presented.

INTRODUCTION

Honey as an excellent adjuvent for acceleration of wound healing is widely accepted and used since ancient times. Soviet surgeon Y.M. Krinitsky obtained good results from using an ointment of honey to treat patients with necrotic wounds. Cavanagh et al used honey in open wounds from radical vulvectomy and noted less bacterial colonization and faster wound healing. S.E.E. Effem et al (1988) observed antibacterial and other properties like debribment of wounds, absorption of oedema, deodorization of offensive foul smelling wounds, in their study with topical application of honey. It is also observed to be effective in decubitus ulcer, infected wounds and burns. Honey is hypertonic and has been shown to be sterile and highly bactericidal by white J.W. et al. Bergman A. et al have shown in their experimental study that honey accelerate the wound healing as it produces rapid epithelization, wound closure and more mature healthy granulation tissue.

This experimental study is carried out to determine if indeed there is truth in the said ability of honey, to aid wound healing .

MATERIAL AND METHOD

Each albino rat irrespective of sex that weighed between 150-200 gms is housed in clean wire mesh cages . Circular 10 mm diameter full thickness defects measuring 78.5 sq mm area to represent healing by second intention, is made by pinching up a point on the skin with forceps and then excising a circular disc of skin with scissors on dorsum of rats at two place on either side of midline representing control group on left side and test group on the right side.

The control wounds are immediately covered with healex spry to form an inert adherent plastic dressing. The test wounds are dressed with pure, fresh, unprocessed honey daily. No other wound care is give. A total of 36 rats are included in this study and divided in 3 batches consisting of 12 each. Four animals are sacrificed at 3rd, 6th and 9th day, post infliction of wounds.

Table - I
Comparison between the area of control and honey treated wounds.

Treatment	Day-1	Day-3	Day-6	Day-9
Control	78.5	168.8 ± 9.4	138.5 ± 3.78	50.78 ± 2.58
Honey treated	78.5	132.9 ± 5.9	83.4 ± 1.75	16.66 ± 1.52

$p < 0.001$ for the over all difference between control and honey treated group. All values are expressed in mm^2 as the mean ± standard error of the mean.

Each wound is measured without tension on the skin and also biopsies are taken, sections are made along the saggital plane close to the center of the wound and stained with haematoxylin and eosin, vangeison and reticullin. The depth and quality of granulation tissue is examined under magnification and recorded at the center of each wound. The thickness of granulation tissue is measured by travelling microscope at University of Allahabad. Its least count is 0.001 mm.

Table - II
Comparison between the thickness of granulation tissue of control and honey treated wounds.

Treated group	Day-3	Day-6	Day-9
Control	0/457 ± 0.02	0.79 ± 0.03	0.92 ± 0.023
Honey treated	0.536 ± 0.02 (17.2 %)	1.250 ± 0.02 (58.2 %)	1.397 ± 0.03 (51.8%)

$p < 0.001$ for the overall difference between control and honey treated group. All values are expressed in mm as the mean ± standard error of the mean.

RESULTS

Following observations are made on each group on day 3, 6 and 9.

i) Wound closure rate (area of wound)

ii) Thickness of granulation tissue.

iii) Quality of granulation tissue.

AREA OF WOUND

On 3rd day size of the wound has doubled in both. By day 6, both show shrinkage in size, dramatically more on the treated side by 40 %. By day nine both wounds have shrunken substantially more on the treated side by 67 %

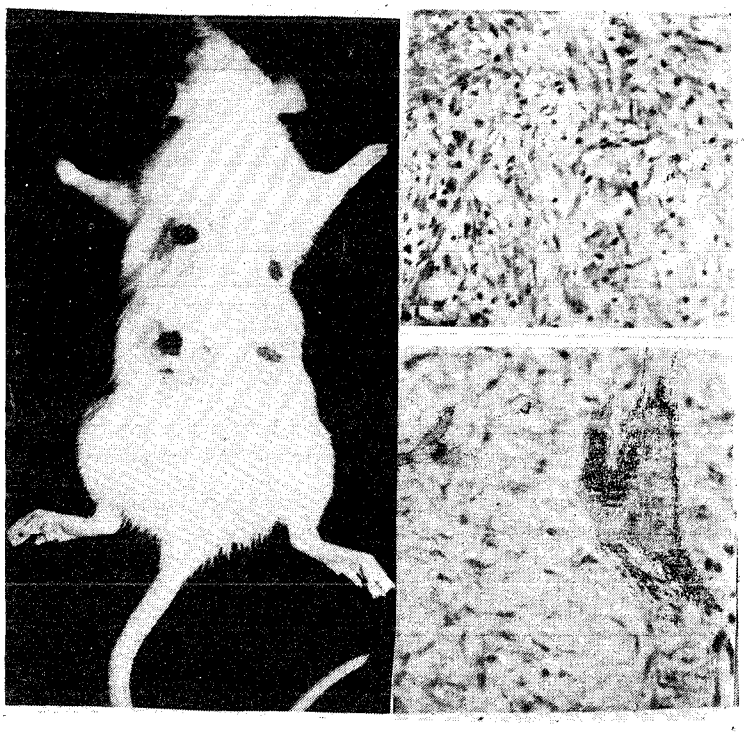
THICKNESS OF GRANULATION TISSUE

The thickness of granulation tissue at the center of wound is greater among honey treated group than control group.

QUALITY OF GRANULATION TISSUE

Histological changes in healing wounds are recorded on day 3, 6, and 9 and correlated with gross observations.

Photographs 1-3



Figurs :

1. Histopathological Changes on day 9 in Honey Treated Group with Nature Granulation Tissue.
2. Control Group 9th Day-Less Mature Granulation Tissue.
3. Wound 9th Day-Treated Wound on Right. Control on Left.

There is intense inflammatory response in honey treated wound as compared to control group and shows increase in number of polymorphs. Scab is also thicker than control. The epithelization has also started in honey treated wounds by day 3.

Mature fibroblast cells, endothelial cells and collagen begin to appear by day 6 in treated wounds and are more, than in control group which correlates with early closure of treated wounds. The more mature granulation tissue is evident by day 6 in treated wounds and wounds are nearly healed by day 9. Control wounds are much larger than honey treated and show less mature tissue and incomplete healing.

DISCUSSION :

Among the variables governing healing, wound closure rate is the most obvious effect visible. The antibacterial property is also responsible for rapid wound healing as it prevents infections. Dold Du and Dzais showed that this property is because of production of hydrogen peroxide and lactic acid by glucose oxidase system present in honey. Low pH and hydroscopic property of honey dehydrates the bacteria and restrict its proliferation.

For all above justifications honey should be used as adjuvant to bring about early healing.

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