

## Therapeutic use of honey for skin wounds healing in Iraqi Awassi sheep

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### Abstract:

The current study was conducted to evaluate the efficacy of honey in the treatment of skin wounds in sheep. Twelve Awassi rams were used in this study. The animals were randomly divided into two equal groups. A 5cm full-thickness skin wound was created on the right flank region of each animal. The wounds in first group were treated with honey single daily after operation until complete healing was occurred, while its in second group treated with sterile saline solution as control group. The results revealed the wound healing process in honey treated group occurred faster than the control group; the healing occurred in 14-15 days after wounding in first group, while in second group it was more than 4 weeks. Within the clinical follow up, no complications occurred in the first group, while the second group showed some complications such as infection and abscess formation. Histopathological examination showed formation of granulation tissue in honey treated group was faster than control group and the regular collagen fiber noticed at 15 days post treated with honey. The present study demonstrates that use of honey is useful for treatment and accelerates healing of full thickness wounds of skin in sheep.

**Key words:** Honey, Wound healing. Sheep.

### الاستخدام العلاجي للعسل في شفاء جروح الجلد للأغنام العواسية العراقية

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### الخلاصة:

أجريت هذه الدراسة لتقييم كفاءة العسل في علاج الجروح الجلدية في الاغنام حيث استخدم اثنا عشر كبش عواسي والتي قسمت عشوائيا الى مجموعتين متساويتين . احدث جرح جلدي بسمك كامل وبطول 5 سم في منطقة الخاصرة اليمنى لكل حيوان. تم علاج الجروح في المجموعة الاولى باستخدام العسل بعد العملية وبواقع مرة واحدة في اليوم ولحين حدوث الشفاء التام ، بينما المجموعة الثانية عولجت بالمحلول الملحي المعقم واعتبرت مجموعة سيطرة . اوضحت النتائج بان

عملية شفاء الجروح في مجموعة العلاج بالعسل حدثت بشكل أسرع من مجموعة السيطرة حيث ان الشفاء حدث بعد العملية بمدة 14-15 يوم في حين كان في المجموعة الثانية أكثر من 4 اسبوع. خلال فترة المتابعة السريرية لم تحدث اي مضاعفات في المجموعة الاولى بينما في المجموعة الثانية حدثت بعض المضاعفات مثل الخمج وتكوين الخراج. بين الفحص النسجي المرضي تكون النسيج الحبيبي كان أسرع في مجموعة العلاج بالعسل عن مجموعة السيطرة ولوحظ تكون الاليف الغراوية المنتظمة في اليوم الخامس عشر بعد العلاج بالعسل. اوضحت الدراسة الحالية بان استعمال العسل ذو فائدة في علاج وتسريع شفاء جروح الجلد في الاغنام.

### Introduction:

Awassi sheep is a highly productive indigenous dairy breed as well as producing wool and meat (1). The low productivity in small ruminant along with high mortality occur due to traumatic injuries and skin infections, the abscesses causes low productivity among these animals through reduce the feed consumption and conversion and sometimes the productions of poisons by invading bacteria into skin wound can lead to even mortalities (2). A wound is an injury that causes either internal or external break in body tissue, while the process of wound healing is a set of coordinated response to tissue injury and classically divided into hemostasis, inflammation, proliferation and remodeling stages (3 and 4).

Wound care by using of plant products are widely used as medicaments for wound healing due to their cost effectiveness , wide spread availability , non toxic , ease of use and fewer side effect, therefore , honey has been a product that has received a growing amount of attention in wound care (5). Honey is a viscous, supersaturated sugar solution derived from nectar gathered and modified by the honeybee, and it has been used since ancient times as a remedy in wound care (6). Several studies suggested that honey promote wound healing with minimal scaring as well as reducing the inflammation, swelling and pain (7 and 8). Laboratory evidence suggests that honey has antibacterial properties that are due partly to its acidity and partly to phytochemicals from the nectar of particular plants (9).

Because of more previous studies showed the use of honey in the laboratory

animals and human trials and nothing in the literatures has reported the use of honey in the sheep, so we decided to perform this study to observe the clinical effect of honey in cutaneous wound of sheep and documented by histopathological examinations of the wound area.

### Materials and Methods:

Twelve Awassi rams were used in this study at the farm of Veterinary medicine college \ Diyala University from September to December 2011. The averages of ages were 1-2 years and their weight ranged between 42-54 kg. Animals were clinically examined and confirmed to be free from any disease, and housed under similar condition and feeding. The animals were randomly allotted into two equal groups. By using aseptic surgical technique, A 5 cm in length incision was made in full-thickness skin of the right flank in each animal under effect of xylazine hydrochloride 2% in dose 0.05 mg/kg. B.W. intramuscularly and the site anesthetized by use of lidocaine 2% locally. Hemorrhage was controlled by sterile surgical sponge compresses.

The first group (honey treated group): in which the skin wounds were received 5 ml pure honey single daily from first day until complete healing of the wound (Fig.1). The second group (control group): in which the wounds received saline solution dressing. Clinical observation were recorded for all experimental animals such as clinical signs of the wound area or any complications may occur at this site for one month of follow up . Histopathological study was done on 5, 10 and 15 days post

operation (one sheep in each group). Biopsies were taken from the wound edges and immediately fixed with 10% neutral buffered formalin and processed routinely, and the sections were stained with hematoxylin and eosin stain according to (10).

### Results:

**Clinical observation:** the clinical examinations showed simple redness and swelling were observed immediately after wounding with light elevation in temperature of wound area. These signs began to subside gradually during the 2-3 days after wounding in honey treated group, while the wounds in control group were more swollen and warmer than first group and needed 4-5 days to subside. There were no wound dehiscence or infection occurred in honey –treated animals, but in second group two animals showed wound infection with exudates (Fig.2) and this lead to abscess formation which then treated by surgical interference

and systemic antibiotic. The wounds in honey-treated animals had completely healing in 14- 15 days, but these signs of healing in control group were slower and demanded more than 4 weeks to complete the healing.

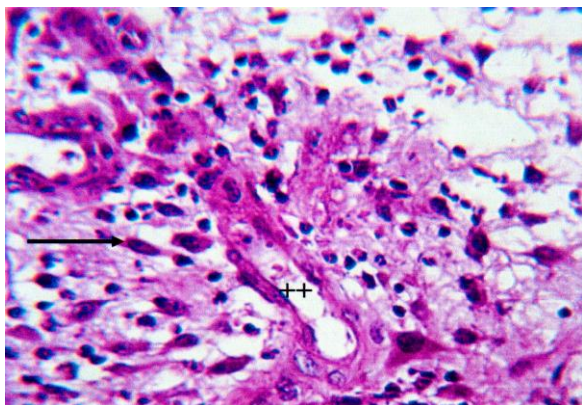
**Histopathological findings:** In honey – treated group the microscopical picture of the wound area at five days post treated with honey showed collagen fiber with mononuclear cells (Fig.3). At ten days after wounding, the wound revealed large amount of granulation tissue formation with newly blood vessels (Fig.4). The sections of skin wound reflected abundant regular collagen fiber filled the wound area at fifteen days post treatment (Fig.5). While the histological picture in control group at five days after wounding showed hemorrhage with inflammatory cells only (Fig.6). At ten days, noticed inflammatory cells infiltration with congested blood vessels (Fig.7). Sections at fifteen days post operation showed collagen fiber with aggregations of inflammatory cells (Fig.8).



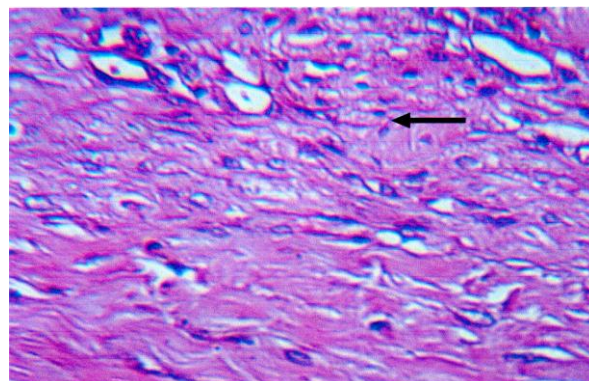
**Figure 1:** Shows application of honey on skin wound in sheep



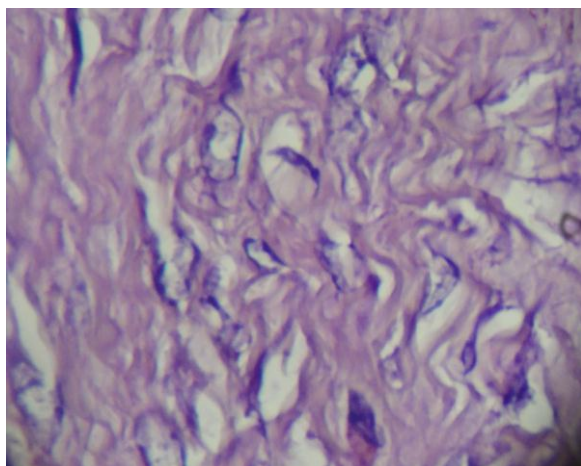
**Figure 2:** Shows swelling and inflammatory exudates in sheep wound of control group



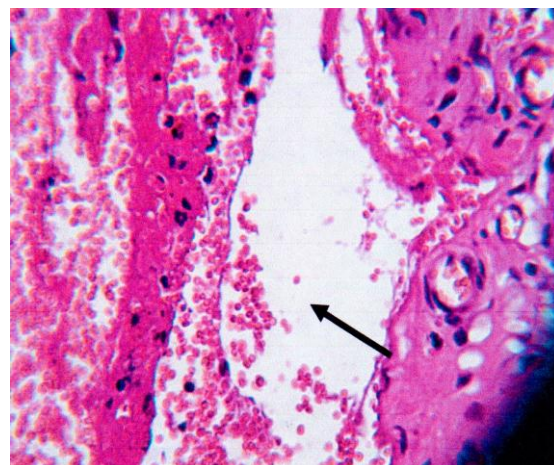
**Figure 3:** Histopathological section in the skin at 5 days post treated with honey shows mononuclear cells and collagen fiber ( H&E 40X)



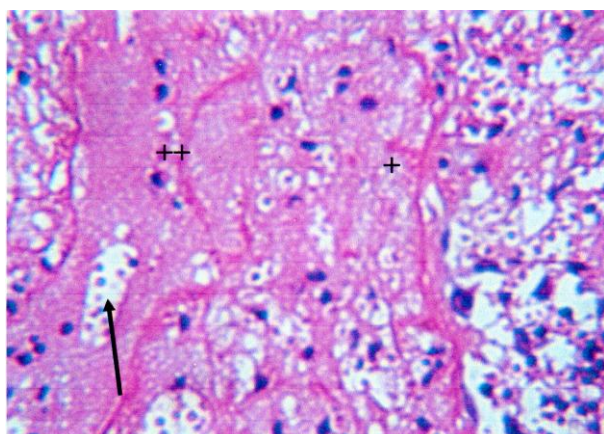
**Figure 4:** Histopathological section in the skin at 10 days post treated with honey shows large amount of granulation tissue formation and newly blood vessels (H&E)



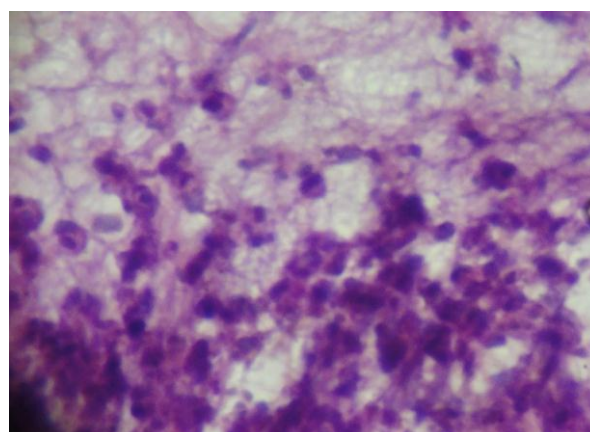
**Figure 5:** Histopathological section in the skin at 15 days post treated with honey shows abundant regular collagen fiber ( H&E 40X)



**Figure 6:** Histopathological section in the skin at 5 days in control group shows hemorrhage and inflammatory cells (H&E 40X)



**Figure 7:** Histopathological section in the skin at 10 days in control group shows inflammatory cells infiltration and congestion of blood vessels (H&E 40X)



**Figure 8:** Histopathological section in the skin at 15 days in control group shows aggregation of inflammatory cells and collagen fiber ( H&E 40X)

**Discussion:**

The results of the present study show incremental effects on wound healing in honey treated group in compared to control group. The results of clinical observations were appeared that slight inflammation on the site of operation which was subsided in 2-3 days in honey treated group because of honey had anti-inflammatory activity that rapidly reduces pain and edema ,this agreed with other author (11). According to our finding, there was no infection, edema or exudate occurred in the honey treated group, which seems to support the results of other studies (12 and 13). Honey is an effective broad spectrum antibacterial agent and stimulates immune response within a wound as well as enhances wound healing (14). In second group , two rams showed wounds infection although it created under aseptic technique and this agree with the author (15) who found the rate of post operative infection on 238 patients underwent clean operation was 8% . Other authors (16 and 17) reported that honey has dehydrating effect due to hygroscopic from its high sugar content which lead to bacterial growth inhibition as well as honey contain glucose oxidase enzyme that convert glucose to hydrogen peroxide which may contribute to some of its antibacterial properties. The present study indicated that the honey was very effective in wound healing because its achieved complete healing within 14-15 days and this lead to make the healing process in honey treated group was much faster than control group. This agrees with other workers (18,19 and 20) that reports the honey has the ability to accelerates healing because of its direct effects on tissue and antibacterial properties which include decreases inflammatory edema, hastens sloughing of devitalized tissue, attracts macrophages which cleanse the wound, provides a local cellular energy source, and protectively covers the wound. Histologically , the levels of healing process were the highest in the honey –

treated group on days 5, 10 and 15 which may indicate that honey accelerates the inflammatory reaction, in addition to activated the synthesis and maturation of collagen fibers, this agreement with (7, 21). Other author (22) refer to that honey hastens wound healing by activation the release of inflammatory cytokines from surrounding tissue cells, mainly monocytes and macrophages as well as activation of endothelial cells and fibroblasts.

The present study demonstrates that use of honey is useful for treatment and accelerates healing of full thickness wounds of skin in sheep.

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