

# Efficacy of honey as a dressing agent in lower limb ulcers

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## Abstract

**Objectives:** To study efficacy of honey, as a dressing agent, in lower limb ulcers. **Methods:** This was a prospective study comprises 53 patients of all the age groups with lower limb ulcer were admitted in the department of surgery and treated with local application of honey to the ulcer. **Observations and Results:** Observations noted in view of reduction in ulcer size, reduction in slough and discharge, culture results, and decrease in pain. In 42 patients duration of symptoms is less than 1 month, 18 patients were suffering from diabetes mellitus, 38 patients were having ulcer size less than 5cm, At the end of 14 days 100% wounds became free of slough and discharge. At the end of seven days only 6 patients were having pain at the ulcer site. On day 14 there was no associated pain. All the 53 ulcers became bacteria free within 14 days. On admission, 44 patients undergone debridement, 47 patients progressed to healthy granulation tissue in 1<sup>st</sup> week and 100% in two weeks. After 14 days ulcer of nine patients completely healed 50 patients had complete healing of the lower limb ulcer after 1 month evaluation. The mean healing time estimated was 19.98 days. **Conclusion:** Honey made the wounds bacteria free within 14 days, honey removes offensive smells and has a desloughing action, stimulates rapid granulation tissue formation, stops further infections and the moist environment very suitable for wound recovery. Honey reduces the need for amputations.

**Keywords:** Honey, efficacy, ulcer, healing.

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## INTRODUCTION

The widespread existence of unhealed wounds, ulcers, and burns has a great impact on public health and economy. Many interventions, including new medications and technologies, are being used to help achieve significant wound healing and to eliminate infections. Therefore, to find an intervention that has both therapeutic effect on the healing process and the ability to kill microbes is of great value. Honey is a natural product that has been recently introduced in modern medical practice. Honey's antibacterial properties and its effects on wound healing have been thoroughly investigated.

Laboratory studies and clinical trials have shown that honey is an effective broad-spectrum antibacterial agent<sup>1,2,3</sup>. This paper reviews data that support the effectiveness of natural honey in wound healing and its ability to sterilize infected wounds. Studies on the therapeutic effects of honey collected in different geographical areas on skin wounds are reviewed and mechanisms of action are discussed. The data show that the wound healing properties of honey include stimulation of tissue growth, enhanced epithelization<sup>4,5</sup> and minimized scar formation. These effects are ascribed to honey's acidity<sup>6</sup>, hydrogen peroxide content<sup>7,8</sup> osmotic effect<sup>9</sup> nutritional and antioxidant contents, stimulation of immunity<sup>10</sup>, and to unidentified compounds. Prostaglandins<sup>11,12</sup> and nitric oxide<sup>13</sup> play a major role in inflammation, microbial killing, and the healing process. Honey was found to lower prostaglandin levels and elevate nitric oxide end products. These properties might help to explain some biological and therapeutic properties of honey, particularly as an antibacterial agent or wound healer. The data presented here demonstrate that honey has considerable therapeutic effects on lower limb ulcers. The results encourage the use of honey in clinical practice as a natural and safe wound healer.

## OBJECTIVES

To study efficacy of honey as a dressing agent, in lower limb ulcer.

## MATERIAL AND METHODS

This prospective study comprises of 53 cases admitted in the surgical ward from August 2013 to October 2015. This group included patients of both sexes and of all ages, all religion and economic strata. Written informed consent of all the patients was taken. This study included cases of all lower limb ulcers like diabetics with ulcers, traumatic ulcers, arterial ulcers and others.

### Exclusions

- Patients with septicemia,
- Patients with malignant ulcers,
- Immunocompromised patients.

All patients were initially examined in the outpatient department and were admitted. A detailed history was collected with particular reference to onset, duration, location of ulcer, and occupational factors and systemic diseases. Any history of similar ulcers was also noted. A careful past history regarding diabetes mellitus, tuberculosis, varicose veins, deep vein thrombosis, peripheral vascular disease and smoking etc. noted. A thorough systemic and local examination was carried out. The morphological features of ulcers i.e. – site, size, number, location, shape, floor, edge, margin, distribution, any discharge or slough, surrounding skin, regional lymph nodes and associated diseases like varicose veins, peripheral vascular disease eczema or patches were noted. A provisional diagnosis of ulcer type was done on the basis of clinical examination. But while presenting only relevant positive and some important negative findings were shown to make the study brief and to avoid unnecessary repetitions. The relevant investigations of all patients were done.

- a) Routine investigation- Hemoglobin (%), ESR,TC and DC, Haemogram
- b) Special investigation – fasting and PP blood sugar, lipid profile, LFT, culture and sensitivity of bacteria / fungus, radiological examination like x-ray.
- c) Investigation of vascular structure of the leg-Doppler ultrasound.

A final diagnosis was made correlating the clinical features and investigations. Systemic antibiotics were given as per the culture report individually. Initial surgical debridement was done on day 1 to those patients having ulcers with purulent discharge and slough. Honey dressing applied 12 hourly to the ulcers of the patients.

Healing was monitored in the following parameters day at 1, 3, 7, 14 and one month follow up.

1. Reduction in the ulcer size
2. Decrease in slough
3. Decrease in discharge,
4. Decrease in pain,
5. Formation of granulation tissue,
6. Wound culture,
7. Complete Healing,
8. Hospital stay.

The outcomes of honey dressing of lower limb ulcer in the form of formation of granulation tissue, decrease in slough, decrease in discharge, decrease in pain and culture negativity were noted at the time of discharge. While discharging, the patients were given discharge card and were asked to come for follow up after 1week. The duration hospital stay recorded in each case.

## OBSERVATIONS AND RESULTS

**Table 1:** Duration of symptoms

Duration in days	No of patients	Percentage (%)
0-10	28	52.8
11-20	9	16.9
21-30	5	9.4
1 m – 2m	3	5.6
> 2m	8	15
<b>Total</b>	<b>53</b>	<b>100</b>

In our study most of the ulcers were of short duration, 0-10 days 28 patients and 11-20 days 9 patients and chronic ulcers >2 months duration 8 patients.

**Table 2:** Presence of slough, discharge and pain

Days	1	3	7	14	30
Slough present in no. of pt	44 (83%0	40 (75.47)	6 (11.3)	0	0
Discharge present in no. of pt	53 (100%)	25 (47.16%)	1 (11.8%)	0	0
Pain present in no. of pt	47 (88%)	30 (56.6%)	6 (11.33%)	0	0

All patients become free of slough, discharge and pain at 14 days.

**Table 3:** Presence of healthy granulation tissue

Presence of healthy granulation tissue in no of pts.	Day 7	Day 14
Present	46 (88.7%)	53 (100%)
Absent	6 (11.3%)	0
<b>Total</b>	<b>53 (100%)</b>	<b>53 (100%)</b>

At the end 14 days all the 53 patients progressed to healthy granulation tissue.

**Table 4:** Organism on wound swab Culture

Organism	Culture at day 1		Culture at day 7		Culture at day 14		Culture at day 30	
	No of patients	%	No of patients	%	No of patients	%	No of patients	%
staphylococci	38	71.7	3	5.6	0	0	0	0
Escherichia Coli	6	11.3	0	0	0	0	0	0
Streptococci	2	3.7	0	0	0	0	0	0
Klebsiella	6	11.3	0	0	0	0	0	0
Nonfermentator	1	1.8	1	1.8	0	0	0	0
<b>Total</b>	<b>53</b>	<b>100</b>	<b>4</b>	<b>7.4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

All the lower limb ulcers at day 14 were found to be sterile as there was no growth of any organism on wound swab culture.

**Table 5:** Reduction of ulcer size

Reduction of ulcer size in percentage	No of patients at day 7	No of patients at day 14
0-25%	50	11
25-50%	3	33
Healing complete	0	9

In our study 50 patients showed 25% reduction in ulcer size, 3 patients showed 50% reduction in ulcer size at day 7, and at day 14, 11 patients showed 25% reduction in ulcer size. 33 patients showed 50% reduction in ulcer size with complete healing of 9 patients.

**Table 6:** Duration of Hospital Stay in lower limb ulcer

Duration of hospital stay in weeks	No. of patients	Percentage (%)
1 week	0	0
2 week	12	22.65
3 week	21	40
4 week	12	22.65
5 week	6	11.3
6 week	0	0
7 week	1	1.88
8 week	1	1.88

In our study minimum hospital stay was 2 weeks and maximum was 7 weeks with mean hospital stay 19.98 days.

**Table 7:** healing complete / incomplete at the end of 1 month

Healing complete / incomplete	No. of patients	Percentage (%)
Complete	50	94.33%
Incomplete	3	5.67%
<b>Total</b>	<b>53</b>	<b>100%</b>

In our study 50 patients had complete healing of the lower limb ulcer after application of honey at the end of one month. Only 3 patients were having incomplete healing but show signs of healing.

## DISCUSSION

This is a prospective observational study to assess the efficacy of honey as dressing agent in lower limb ulcers. In this study 53 cases of lower limb ulcers were admitted

in our tertiary care centre from August 2013 to October 2015 and treated with honey dressing.

### Age

In our study, we included all the patients with all age groups. Common age group were 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> decade 24.5%, 18.8% and 28.3% respectively. The youngest patient was 12 years and oldest was 74 years old. Gethin<sup>14</sup> in 2009 included only patients above 18 years with venous leg ulcers. Efem *et al*<sup>15</sup> in 1988 included all age groups, youngest was 2 months age and oldest was 78 year old.

### Sex

In this study males 32 were affected more than females 21. Although females are more prone for chronic leg ulcers, traumatic ulcers are more common in males. Efem<sup>15</sup> in 1988 included 47 males and 12 females. Jull *et al*<sup>16</sup> 2008 included 50% males and 50% females.

### Duration of Symptoms

In our study most of the ulcer were of short duration history 0-10 days 28 and 11-20 days 9. Chronic ulcers >2 months duration are 8 only.

### Associated diseases

In our study 18 patients were having associated diabetes mellitus. Gethin<sup>14</sup> 2009 included 54 patients with hypertension in 14, patients with history of deep vein thrombosis in affected leg.

### Presence of slough

In our study, 44 patients were having ulcers covered with slough on admission which gradually decreased to 40 patients on day 3 and 6 patients on day 7. At the end of 14 days all wounds became free of slough. Efem<sup>15</sup> 1988- Slough and necrotic tissue were rapidly replaced with granulation tissue and advancing epithelialization after application of honey. Gethin<sup>14</sup> 2009- after 4 weeks of honey treatment 80% of all the wounds had a reduction of slough by 50%

### Presence of discharge from the ulcer

In our study all 53 patients were having ulcers with purulent discharge on admission, which after application of honey gradually decreased to only 1 patient on day 7. At the end of 14 days all wounds became free of purulent discharge. Efem<sup>15</sup> 1988- At the end of one week, surrounding oedema subsided, weeping ulcers were dehydrated and foul smelling wounds were rendered

odorless within one week of dressing with honey. Kegels<sup>17</sup> 2011-infected wounds were controlled within a few days. All the wounds progressed to healing without any adverse effect.

#### **Presence of Pain**

In our study 47 patients were complaining pain at the ulcer site which gradually reduced to 6 patients on day 7. Pain in all the patients was absent at the end of day 14. Dunford<sup>18</sup> 2004- Pain decreased from Mc Gill's score of 1.6 to 1.08 in 12 weeks period of honey application.

#### **Organism on wound swab Culture**

In our study, the organism isolated on day 1 were mostly staphylococci in 38 patients. Other organisms isolated were E.coli, Klebsiella, Streptococcus and nonfermentator. 49 patients show no organisms on culture on day 7, and all the wounds were found to be sterile at day 14. Efem<sup>15</sup> 1988- In his study after one week of honey dressing no growth yielded. Natrajan<sup>19</sup> 2001- case report: MRSA was eradicated with rapid healing achieved.

#### **Presence of healthy granulation tissue**

In our study 47 patients progressed to healthy granulation tissue and 6 patients remained unhealthy, without healthy granulation tissue at day 7. All 53 patients progressed to healthy granulation tissue at the end of day 14. Efem<sup>15</sup> 1988- Slough and necrotic tissue were rapidly replaced with granulation tissue and advancing epithelialisation. Gethin<sup>14</sup> 2009- Epithelialisation and granulation tissue formation was visible at an earlier stage in Manuka Honey group.

#### **Ulcer size**

In our study 38 patients were having ulcer size <5cm and 11 patients with ulcer size 5-10 cm. only 4 patients were having larger wounds. After the application of honey dressing over the ulcer, on the 7<sup>th</sup> day the result showed that, 50 patients showed 25% reduction in ulcer size, 3 patients showed 50% reduction in ulcer size. On day 14, 9 patients completely healed, 11 patients showed 25% reduction of ulcer size, 33 patients showed 50% reduction in ulcer size. The mean reduction of the ulcer size is 33.87%. Efem<sup>15</sup> 1988- Slough and necrotic tissue were rapidly replaced with granulation tissue and advancing epithelialisation. Gethin<sup>14</sup> 2009- Median reduction in wound size was 34% as compared to 13% at the end of 4 weeks. Jull *et al*<sup>16</sup> 2008 – The mean reduction of baseline ulcer area was 74.1% in the honey treated group and 65.5% in the usual care group.

#### **Duration of Hospital Stay**

In our study, 12 patients required hospital stay of 2 weeks, 21 patients required hospital stay of 3 weeks, 12 patients required hospital stay of 4 weeks and 8 patients required hospital stay of more than 4 weeks. The mean healing time estimated was 19.98 days. Gethin<sup>14</sup> 2009-

The manuka honey group had a 34% reduction in median size of ulcer as compared to 13% reduction in HT group which is suggestive of hospital stay is reduced in honey dressed patients. Jull *et al*<sup>16</sup> 2008 – Mean time of healing was 63.5 days in honey treated group and 65.3 days in the usual care group.

#### **Healing complete / incomplete**

In our study 50(94.33%) patients had complete healing of the lower limb ulcer. Only 3 (5.67%) patients were having incomplete healing at the end of one month but shows signs of healing. The mean healing time in our study is 19.98 days. Gethin<sup>14</sup> 2009- Healing achieved in 44% of patients treated with manuka honey as compared to 33% patients who were treated with hydrogel in 12 weeks. Jull *et al*<sup>16</sup> 2008- At 12 weeks 55.6% honey treated group had healed compared to 49.7% in usual care.

## **CONCLUSION**

In all of the observed cases, there were no allergic reactions or adverse side effects due to honey dressing. Our observations on honey's role in wound debridement, wound deodorization, absorption of oedema fluids and improvement of nutrition are very similar to those that have been reported by Efem.

In short what we have observed can be summaries as below:

1. Honey sterilized the wounds very quickly, the wounds were bacteria-free by the second week of honey dressing (even resistant Staphylococcus aureus, strains were killed)
2. Honey removes dead tissue and cells very effectively (desloughing).
3. Honey removes offensive smells
4. Honey reduces oedema
5. Honey reduces the need for amputations
6. Honey stimulates rapid granulation tissue formation
7. Honey stops further infections
8. Honey provides the moist environment very suitable for wound recovery as well as bone protection (if exposed).

Our study has shown conclusively that honey dressing healed 53 infected wounds. This was clinical observation study with 100% success undertaken at our hospital. Honey is inexpensive, easily available and above all is extremely effective. It does however require more human touch to perform honey dressing as compared to modern dressing. Modern dressings which require less changing and less frequent wound inspection have led to wound deterioration go unnoticed. A number of cases have resulted in severe amputations.

Based on these results, it is highly recommended that gamma-irradiated honey be accepted by conventional medicine to be used for wound dressing without prejudice.

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