

THE ROLE OF HONEY IN THE MANAGEMENT OF DIABETIC FOOT ULCERS

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ABSTRACT

Objective: This study was performed to compare dressings with honey/normal saline to povidone iodine/hydrogen peroxide in the management of diabetic foot ulcers.

Methods: Two hundred patients with diabetic foot ulcers were allocated randomly to two groups according to the dressing material used. The study was performed between 1996-2001 in four district hospitals in Jordan.

Results: The study showed that introducing honey/normal saline as a method of dressing reduced time of the healing, hospital stay and cost by 34%, 43%, 50%, respectively. The need for amputations was also reduced by 50%. The dressing material irritation and allergy were markedly reduced in comparison with povidone iodine/ hydrogen peroxide.

Conclusion: The use of honey and normal saline protocol appeared to reduce the time of healing, hospital stay and the need for amputation. It is non-irritant, has antimicrobial effect and a debriding action. It also promotes healing, and is cost effective in the management of diabetic foot ulcers.

Key words: Honey, povidone iodine, Diabetic foot ulcer.

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Introduction

Ancient remedy has been rediscovered for the use of honey as a wound dressing material. Efer showed that various types of wounds and skin ulcers, which had not responded to conventional methods of treatment such as antibiotics and medicated dressings, responded favourably to topical honey treatment ⁽¹⁾.

Iodine compounds (povidone iodine and cadexomer iodine), chlorhexidine, hydrogen peroxide, acetic acid, and silver compounds were also used as dressing agents ⁽²⁾.

Despite attempts at prophylaxis, foot ulcers remain a frequent complication of diabetes. Delayed or inadequate treatment of foot infections in diabetic patients often results in limb loss and the management of the complicated lesions can be both challenging and rewarding so the correct treatment and dressing material used for diabetic foot ulcers remains underestimated.

The aim of the study was to compare the effect of the use of honey/normal saline combination with povidone iodine/hydrogen peroxide combination in vivo regarding the time of healing, hospital stay, and cost and to avoid the need for amputation and dressing material irritation.

Methods

From 1996-2001, two- hundred and three consecutive patients with diabetic foot ulcers who were admitted to the surgical departments in four district hospitals in Jordan, were treated using two different methods.

Three patients, who died during the study period from other medical illness, were excluded. Patients were randomly allocated into two groups, after an informed consent had been obtained. Age, sex distribution were similar in the two groups (Table I) as was the number of ulcers per patient, intravenous antibiotics and surgical debridement under general anesthesia.

Povidone iodine / hydrogen peroxide dressing method (Group I)

Wounds were debrided under aseptic technique followed by washing with povidone iodine and hydrogen peroxide in a ratio of 3:1, then packed with soaked gauze of the same solution and covered with occlusive or absorbent secondary dressings. Three times daily dressing changes were applied, then declined as the treatment progresses until healing was achieved.

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Honey and normal saline dressing methods (Group II)

Debridement was done in a similar manner to group I and washed with normal saline, then packed with Jordanian natural honey impregnated gauze and occlusive or absorbent, secondary dressings were needed to prevent honey oozing out from the wound dressing. Three times daily dressing changes were applied, then declined as the treatment progresses until healing was achieved, similar to group I

Differences in healing, hospital stay and cost were analysed using T test. Amputation, positive culture swab and allergy were evaluated using Chi-square. Statistical significance was also calculated.

Results

There were 200 patients involved in the study, 112 males and 88 females with a mean age of 58 years. The patients were divided equally into two groups according to the treatment method (Table I), the mean healing time was 32 (7-90) days in group I compared to 21 (7-70) days in group II while, the hospital stay was 23(7-56) days in group I compared 13 (7-42) days. The hospital staying was reduced by 43% ($P < 0.001$) and healing time was reduced by 34% ($P < 0.001$) in group II compared to group I (Table II).

Honey/normal saline was applied to 10 patients from group I who failed to respond to povidone iodine / hydrogen peroxide dressing method within the duration of the study. Dramatic improvement was achieved in eight of them within three weeks, and the remaining two eventually underwent amputation.

Unfortunately, a number of patients deteriorated and needed amputation, 20 cases of group I (toe amputation 12, below knee 7, above knee 1), compared to 10 in group II (6, 3, 1) respectively, so the percentage was reduced by 50% ($P < 0.05$).

Culture swabs were taken from all patients weekly in group I. Thirty-eight patients became clean within one week, 43 within two weeks and the remaining 19 patients within six weeks, while in group II, 70 patients became clean within one week, 12 patients within two weeks, and the remaining 18 patients within four weeks ($P < 0.001$).

Out of the 200 patients 140 showed mixed growth, 40 had pseudomonas colonization and 20 had Eschereria coli. Sixty patients with antibiotic-resistant strains were divided equally between the two groups; wounds became clean in 5 patients in group I compared to 15 patients in group II by the seventh day of treatment.

The number of patients showing irritation and allergy to povidone iodine/hydrogen peroxide was 14 while none had allergy to honey/normal saline ($P < 0.001$).

It was noted that honey dressing was easier to apply and remove with normal saline without adhesions, damage to the granulation tissue or bleeding, compared to those on conventional treatment.

The cost of treatment was evaluated in both groups and showed reduction from 520 Jordanian Dinars (JD) to 260 JD in uncomplicated cases and from 1000 JD to 480 in complicated cases (50% in uncomplicated patients and 52% in complicated patients ($P < 0.001$)) (Table IV).

Complicated cases were defined as those patients who need amputation within the study period or/and patients with positive culture for antibiotic resistant strains.

Discussion

Diabetic foot complications are the most common cause of nontraumatic lower extremity amputations in the industrialized world, the risk of lower extremity amputations is 15-46 times higher in diabetics than in non diabetics ⁽³⁾. Furthermore, foot complications were the most frequent reasons for hospitalisations in patients with diabetes accounting for up to 25% of all diabetic admissions in United States and Great Britain ⁽³⁾.

Honey has been used to treat infections in a wide range of wound types (burns, venous leg ulcers of mixed etiology, diabetic foot ulcers, unhealed graft donors, abscesses, boils, pilonidal sinuses and necrotizing fasciitis) ^(4,5).

Several studies showed that honey had the ability to provide a protective barrier to prevent cross infection and the create an antibacterial moist healing environment, which rapidly clears infecting bacteria including antibiotic-resistant strains ⁽⁴⁾. Studies have also shown that it has the debriding effect by osmotic action which causes an outflow of lymph, lifting debris from the wound bed, rapidly removes malodour, promoting healing stimulating tissue regeneration, is non-adherent and therefore minimizes healthy tissue trauma, allergy, irritation and pain during dressing changes and reduces oedema by its anti inflammatory action ⁽⁵⁻⁹⁾. Similar results were obtained in our study.

Other studies showed that many patients had unhealed ulcers due to different causes and were not improved by conventional treatment, although good results were achieved when honey application was used ⁽⁹⁾, similar results were noticed in our study.

Hydrogen peroxide concentration in honey is around one mmol/litre, while it is around one thousand mmol/litre in the standard 3% solution, which has been found to be harmful to wounds when added as a rinse solution. On the other hand, honey proved to prevent bacterial growth through its acidic pH (pH 3.6) ⁽⁹⁾.

There is also an economical advantage when using honey as a wound dressing. This is seen both in the direct cost savings and in the savings in ongoing costs when consideration is given to the more rapid healing rates that are achieved. In addition there are the savings in the costs of surgery where debridement becomes unnecessary when honey is used ^(8,9).

Honey is also an ideal first-aid dressing material, especially for patients in remote locations when there could be time for infection to have set in before and after

Medical treatment is obtained, it is readily available and simple to use. It would be particularly suitable for first-aid treatment for diabetic foot ulcers.

Conclusion

Using honey in wound treatment is documented. No toxic effects have been reported in the literature compared to povidone iodine/hydrogen peroxide and many studies support the clinical safety and efficacy of honey.

Significant experimental data proved the antibacterial

Table I. Patients data.

	Group I (n=100)	Group II (n=100)
Sex (Male: Female)	54:46	58:42
Age(Years)	22-100	24-100
Mean Number of Ulcers/patient	2.1	1.8
Debridement under General Anesthesia	40	38

properties and histological effect of honey on a wide range of bacteria even antibiotic-resistant strains. Furthermore, our study shows that the healing and hospital stay time were shorter with honey/normal saline than povidone iodine/hydrogen peroxide.

Using honey/normal saline significantly reduced amputations, wound dressing irritation, adhesion and treatment costs, and thus we strongly recommend the use of honey/normal saline for successful treatment of diabetic foot ulcers.

Table II. Healing and hospital stay in days.

	Group I	Group II	P Value
Time of healing	7-90 Days	7-70 Days	P < 0.001
Median	32	21	
SD	20.89	15.97	
Hospital stay	7-56 Days	7-42 Days	P < 0.001
Median	23 Days	13 Days	
SD	14.54	8.26	

Table III. Patients negative wound swab culture (clean wounds) and treating time.

	Group I	Group II	P Value
Admission day	0	0	P < 0.001
7	38	70	
14	43	12	
21	9	10	
28	5	8	
35	4	0	
42	2	0	

Table IV. Dressing Type and Treatment Cost.

Mean Cost in Jordan Dinar	Group I	Group II	P Value
Non complicated patient	520	260	P < 0.001
Complicated patient	1000	480	
SD	192.97	66.33	
Mean	616	282	

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