

## ORIGINAL ARTICLE

## ROLE OF HONEY IN WOUND DRESSING IN DIABETIC FOOT ULCER

Abdul Rashid Surahio, Ashar Ahmad Khan\*, Main Usman Farooq\*\*, Iffat Fatima

Department of Surgery, Liaquat University of Health and Medical Sciences, Jamshoro, \*Nishter Medical College, Multan, Pakistan,

\*\*Department of Medical Education, King Abdullah Medical City, Makkah, Kingdom of Saudi Arabia

**Background:** Honey has antibacterial and antimicrobial properties. This study was conducted to evaluate the efficacy and role of honey as local wound dressing agent in the management of diabetic foot and its effect on rate of amputation. **Method:** This prospective observational study was done in the general surgery department, Al- Noor Specialist hospital, Holly Makkah, KSA from 1<sup>st</sup> March, 2007 to 31<sup>st</sup> May, 2008 (15 months). This study includes 172 patients of either gender, above 18 years of age, belonging to different nationalities admitted to Al- Noor specialist hospital, Holly Makkah, KSA. **Results:** A total of 172 patients with male to female ratio 1.54:1 were admitted from 1<sup>st</sup> March, 2007 to 31<sup>st</sup> May, 2008 with complicated and non-healing diabetic foot ulcers. Out of these 172 patients, 135 (78.48%) were Saudi and 37 (21.52%) were non Saudi residents with ratio of 3.6:1. After admission and resuscitation, all the patients under went early surgical debridement and dressing with the thick layer of honey locally available. Wounds became healthy within 7–35 days. Three patients (1.75%) underwent big toe amputation and 2 (1.16%) patients under went below knee amputations. Twenty (11.6%) patients under went split skin grafting to cover the wound while in other patients wound healed by secondary intention. **Conclusion:** Use of honey significantly reduced rate of amputation and improve wound healing when used for wound dressing in chronic diabetic foot ulcers.

**Keywords:** Diabetic foot ulcer, honey, dressing

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## INTRODUCTION

For centuries honey were used as an effective remedy for the treatment of wounds and ulcers. There are many similarities in the composition of honey that together combine to give it its antibacterial and antimicrobial properties. Honey is a saturated or supersaturated solution of sugars that has more interaction with the molecules of water. Low pH of honey between 3.2–4.5 and this acidity is low enough to inhibit the micro organism to grow.<sup>1</sup> honey has less free water to inhibits the growth of micro organisms. When honey is mixed with wound exudates, hydrogen peroxide is formed due to enzyme glucose oxidase reaction. This enzyme slowly released to provide its antibacterial activity but does not give harm to the body tissue. Honey is most frequently used as a topical antibacterial agent to treat infections in a many types of wound.

Use of Honey as a medicine for variety of diseases since antiquity.<sup>2</sup> Its use in ayurvedic medicine not new it was in use since 2500 BC and other old cultures also know the use of honey as well.<sup>3</sup> Honey has been shown its effectiveness against two serious problem producing bacteria, namely Methicilin resistant *Staphylococcus aureus* (MRSA)<sup>4</sup>, and *Pseudomonas aeroginosa* honey with a good antibacterial activity could be seen to be effective in preventing growth of bacteria on the surface of wound even if the honey was diluted with the secretions from wound more than tenfold.<sup>5-6</sup> With the prolonged use of honey in wound dressing does not develop of drug resistance as seen in use of antibiotics.<sup>7</sup> Diabetics

patients have poor circulation of blood and less ability to fight with infection. Diabetic feet ulcers can be treated with systemic antibiotics with long time use can develop drug resistant organisms. Role of honey in the treatment of wound those has a antibiotic resistant bacteria is indicated.<sup>8-9</sup>

Although many previous studies has been done on the use honey in the chronic or acute wound, but here we want to see the role of honey in non healing chronic diabetic foot ulcers in local population.

## MATERIAL AND METHODS

This prospective observational study was done in department of general surgery, AL Noor specialist hospital, Holly Makkah from 1<sup>st</sup> March, 2007 to 31<sup>st</sup> May, 2008 (15 months). AL Noor specialist hospital is an only tertiary care and referral hospital in the region of Holly Makkah. Total 172 patients of age 18 years and above with diabetic foot complications were included in the study. All the patients were admitted through emergency department. After admission all the data were recorded on predesigned *pro forma* and consent were taken for study. All the routine investigations like complete blood count, chemistry, coagulation profile, arterial blood gases, chest x-ray and X-ray of foot were also done to see the soft tissue and bony status of foot. Empirically broad spectrum intravenous antibiotics started after sending wound swab for culture and sensitivity. Most of the patients under went primary debridement of foot ulcer and removal of dead tissue. Dressing was done three times in a day first wash with normal saline

than thick layer of honey applied and sterile dressing done.

**RESULTS**

Total 172 patients admitted from 1<sup>st</sup> March, 2007 to 31<sup>st</sup> May, 2008 with the complicated diabetic foot ulcers and non healing chronic diabetic foot wounds. Out of these 102 patients (59.3%) were male and 70 (40.7%) female with the ratio of 1.54:1. Out of 172 patients 135 (78.48%) were Saudis and 37 (21.52%) were non Saudi residents with the ratio of 3.6:1. Patients with other nationalities include, Nigeria 10 (5.81%), Burmawi 12 (6.97%), Bangladesh 7 (4.06%) and Pakistani 6 (6.97%). after admission resuscitation of the patient was started with the intravenous fluid and intravenous antibiotics. All the patients underwent early surgical debridement and dressing was done with the thick layer of honey locally available. Dressing was done three times in 24 hours after washing the wound with the normal saline. Wound became healthy within 7–35 days and 3 patients underwent big toe amputation and 2 patients underwent below knee amputation because of micro & macro vascular problem due to diabetes (Table-1). Twenty patients underwent split skin grafting to cover the wound, while in other patients wound healed by secondary intention. It was noted that honey dressing was easier to apply and remove with normal saline with out adhesions, damage to the granulation tissue or bleeding (Table-2).

**Table-1: Socio-demographic data and duration of healing (n=172)**

Variable		Number	Percentage
Sex	Male	102	59.3
	Female	70	40.7
Nationality	Saudi	135	78.48
	Non Saudi	37	21.52
Age(Years)	25–45	52	30.25
	45–70	93	54.10
	>70	27	15.65
7–15 Days		50	29.1
15–30 Days		95	55.2
30–35 Days		27	15.7

**Table-2: Surgical outcome (n=172)**

Features	Variable	Number	Percentage
Level of Amputation	Big Toe	3	1.75
	Below Knee	2	1.16
Type of Anesthesia	General Anesthesia	70	70.7
	Other type of Anesthesia (Spinal, Lumbar, Ankle Block)	102	59.3

**Table-3: Microbiology (n=172)**

Microorganism	Number	Percentage
<i>Streptococcus group-A</i>	20	11.63
<i>Pseudomonas aeruginosa</i>	30	17.44
<i>Staphylococcus aureus</i>	20	11.63
MRSA	35	20.35
No growth of organism	67	38.95

**DISCUSSION**

Diabetic foot due to its complications is the most common cause of non traumatic amputations in lower extremity in industrialized areas of the world. Lower extremity. Risk of amputations is more than 15–46 times higher in diabetics than in non diabetics.<sup>10</sup> One of the single most common cause of hospitalization is foot ulcers and in diabetic patients lower extremity amputation.<sup>11</sup> Complications of foot in diabetic patients are very difficult to treat and more expensive.<sup>12</sup> Honey has been used for the treatment of different varieties of infections in a many types of wounds just like a (burns, venous leg ulcers of mixed etiology, diabetic foot ulcers, unhealed graft donors and necrotizing fasciitis).<sup>13,14</sup>

Several studies showed that honey had the ability to provide a protective barrier to prevent cross infection and create an antibacterial moist healing environment.<sup>14</sup> Some studies have also shown that it has the debriding effect by osmotic action which causes an out flow of lymph, lifting debris from the wound bed, rapidly removes malodor promoting healing stimulating tissue regeneration, decreased pain during dressing changes and reduces oedema by its anti inflammatory action.<sup>15</sup> Same results were seen in our study. Farouk A *et al* mentioned in their study that many patients who had unhealed ulcers due to different causes and were not improving by conventional treatment, good results were achieved by honey dressing,<sup>16</sup> same trends was seen in our study.

Use of honey in field of medical been used in traditional medicine over many years, many physicians reluctant and fell difficulty to use it for dressing because its use is often very difficult or there is no standardized preparation readily available in most countries especially in developing countries where they usually use honey which is available from local and commercially sources produced in their region.<sup>17</sup>

Other studies addressed its anti-inflammatory properties which were demonstrated that the use of honey can decrease in oedema and pain. Another study done in Iran in that they showed the use of honey in the treatment of infected wounds following open fractures<sup>18</sup> while in our study we use of honey in chronic diabetic ulcers. In our study the rate of amputation is lower as compared to other studies Another study done in Jordan by Hammouri SK, showed that the honey is good for the healing of chronic diabetic foot ulcers, same pattern seen in our study.<sup>19</sup> So we conclude in our study the effect of honey as antibacterial effect and no resistant found in honey for organisms.

**CONCLUSION**

Significant experimental data proved the antibacterial properties and histological effect of honey on wide range of bacteria even antibiotic resistant strains. Use of

honey significantly reduced rate of amputation and improve wound healing when used for wound dressing in chronic diabetic foot ulcers. We recommend that honey can be used successfully for the treatment of diabetic foot ulcers.

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## Address for Correspondence:

**Dr. Abdul Rashid Surahio**, Consultant, Ghani Hospital, Sidhi Muslim Housing Society, Qasimabad, Hyderabad, Pakistan.

**Cell:** +92-302-2631889, **Tel:** +92-22-2670032

**Email:** a\_surahio@yahoo.com