Journal of Biomedical Investigation, 2010, 8(1) 32 - 35

Original Article

A COMPARISON OF PURE NATURAL HONEY AND EDINBURGH UNIVERSITY SOLUTION (EUSOL) IN THE MANAGEMENT OF CUTANEOUS ULCERS

[1]Onyiaora I. V, [2]Akujobi C. N, [3]Adeyemi O. O, [4]Atinomo C. E and [2]Uba O. N

[1]*Department of Morbid Anatomy,* [2]*Department of Medical Microbiology/Parasitology College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus.* [3]*Department of Pharmacology,* [4]*Department of Surgery, College of Medicine, University of Lagos, Lagos.*

Abstract

Honey is an ancient remedy for the treatment of infected wounds. This study compared the effects of Pure Natural Honey and Edinburgh University Solution (EUSOL) in the management of cutaneous ulcers. Sixteen participants with cutaneous wounds/ulcers were studied to assess the efficacy of pure natural honey as wound dressing in comparison with Edinburgh University Solution (EUSOL). The participants were grouped into; Honey group (n=15) and EUSOL group (n=12). On daily basis, the wound sites were cleaned with saline and the base of the ulcer swabbed for microbiology culture and sensitivity studies. Thereafter, the patients' wounds were dressed with sterile gauze soaked in honey or Eusol as the case may be. The result showed that among the honey group, 80% of the ulcers were rendered sterile within one week and 90% healing was achieved within six weeks while among the EUSOL group the ulcers became sterile within one week, but only 33.3% of the ulcers healed within six weeks. Reduction of tissue oedema was seen much earlier and was more remarkable with ulcers on honey dressing. Honey is tissue-friendly. The antiseptic and wound healing properties when considered along with its low cost and high availability make it a good wound dressing agent.

Key words: *Honey, Eusol, Cutaneous, Ulcer, Management.*

INTRODUCTION

Honey was used to treat ulcers as long as 4000 years before bacteria was discovered to be the cause of infection[1-3]. In 50AD, Dioscorides described honey as being "good for all rotten and hollow ulcers"[4]. It has also been reported to have inhibitory effect to about 60 species of bacteria including aerobes and anaerobes, gram positive and gram negative bacteria, fungi and dermatophytes[5,6]. The antibacterial property of honey was first recognized in 1892 by Van Ketel[7]. It may inhibit bacteria growth due to a number of different reasons: high sugar concentration (reduced water activity), low pH, hydrogen peroxide generation, proteinaceous compounds or other unidentified components present in honey may all provide antimicrobial activity[8]. Honey absorbs the oedema on the margin of wounds and removes the foul smell from septic wounds[2,9]. The deodorizing effect of honey may be by its provision of glucose, which is metabolized to lactic acid by the infecting bacteria, rather than ammonia produced from protein, which is malodorous. More so, the hydrogen peroxide produced in honey would not allow the growth of anaerobes which causes foul smell in wounds[10]. The ability to modulate production and quenching of free radicals may contribute to the demonstrated ability of some types of honeys to help in resolving the state of inflammation typifying chronic wounds[11]. Eusol is an orthodox wound antiseptic and dressing. It is a homogenous mixture of boric acid and chlorinated lime in water. In solution, they are active as hypoborus acid and hypochlorous acid. Eusol has been shown to remove sloughs from necrotic wounds and ulcers. It also sterilizes infected wounds and ulcers and has been known to inhibit micro-organisms[12]. However, hypochlorite and hypoborite solutions have not been shown to directly encourage or enhance the regeneration or growth of tissues. Much of free radical species like oxygen radicals are generated by hypochlorites[13]. These free radicals are not

For Correspondence: Dr. C. N. Akujobi. E-mail:adakujobi@yahoo.com

tissue friendly. The increase in antibiotic resistant microbial strains has led to the re-evaluation of the therapeutic use of ancient remedies like honey. The study was done to compare wound healing properties of honey and Eusol.

MATERIALS AND METHOD

Study population: 27 participants with cutaneous wounds or ulcers from three hospitals-Dortem Specialist Hospital, Maple Hospital and Family Health Hospital and Maternity (all in Lagos-Nigeria) were enrolled for the study after obtaining their informed consent. The age, sex, and medical/surgical history were noted. The study population was grouped into Honey group (n=15): these participants were placed on honey dressing for their wounds and EUSOL group (n=12): these participants were placed on Eusol dressing. The surfaces of the wounds or ulcers to be studied were observed carefully during the first visit. The wounds were then cleaned thoroughly with saline and the base of the ulcer swabbed with sterile swab stick and sent to the microbiology laboratory immediately for culture. The ulcers were thereafter measured along their greatest length and breadth in centimeters. The ulcers were then cleaned very well using saline and dressed with sterile gauze soaked in honey or Eusol depending on the grouping. The wound dressing was done daily but as healing progressed, it was changed to alternate day dressing. The size of the ulcers was measured weekly and recorded as in the beginning of the study. Swabs were collected weekly for culture until the wounds became sterile.

ETHICAL ISSUES

Participation in the study was optional and participants were free to withdraw at any point in the study if they so chose. The study did not add any additional cost or health risk to the patient.

INCLUSION AND EXCLUSION CRITERIA

Participants with cutaneous ulcers/wounds with no evidence of systemic involvement (e.g. fever) and who were not currently on any antimicrobial agent were included. Participants that took antibiotics or any drug that may negatively or positively influence wound healing were removed from the study.

RESULTS

Twenty seven patients were enrolled in the study but only sixteen completed the study. Eleven patients fell out of the study because they defaulted by either taking antibiotics, or using alternative dressings like dermazine and cicatrin. Only one patient actually absconded. All the wounds dressed with either honey or Eusol were debrided and sloughs disappeared within 3 days of dressing. The wounds and ulcers became clean, deodorized and healthy in both groups. In the honey group, the inflammatory oedema on the wound margin subsided remarkably by the 2nd day and completely disappeared by the 4th day. For the Eusol group, the inflammatory oedema disappeared in 5 to 7 days.

In 8 participants (80%) whose wounds were treated with honey, the wounds became sterile within 7 days, but by the end of the 2nd week the remaining 20% became sterile while the wounds placed on Eusol were sterile within 7 days of treatment.

Ninety percent of the wounds treated with honey healed within six weeks as against 33.3% wound healing achieved at 6 weeks with Eusol. The pattern of wound size reduction is shown in Tables 1 and 2. Wounds treated with Eusol bled profusely during dressings while the reverse was the case with honey and it is worthy of note that there were no adverse reactions. The organisms isolated from the wound swabs are as follows: *Pseudomonas* was the most frequent, followed by *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella aerogenes*, *Proteus mirabilis* and *Enterococcus faecalis*

DISCUSSION

The study has reconfirmed the multifaceted approach of pure natural honey in enhancing wound healing. Honey, because of its different constituents, has advantageous physiochemical, biochemical and biological processes. Some honeys have additional phytochemical antibacterial components.

Efem[9] and Atimono et al[2] claim that honey dressing debrides wounds and removes necrotic tissues. This was well demonstrated in this study. Eusol was also seen to do the same in the same range of about 3 to 4 days. Pure natural honey and Eusol were equi-effective and very useful in wound

toileting as shown in the study. This is clear from the inference drawn from the study, where heavily infected and necrotic wounds and ulcers of different aetiologies (diabetic ulcers, sickle cell melleolar ulcer, bed-sores, ragged wounds and burn wounds), were managed with honey and Eusol.

Dressing wounds with honey controlled the inflammatory process as evidenced by marked reduction or disappearance of the tissue oedema around the wounds within a few days of treatment much faster than Eusol and also produced healthy granulation tissues earlier. Okeniyi et al[14] in a study that compared the healing of incised abscess wounds with honey and Eusol dressing observed that the wounds dressed with honey became sterile earlier, produced healthy granulation tissue faster and healed faster than those on Eusol dressing. In some other studies, honey was used in the management of burns, and it was found to produce fewer incidents of contractures[15, 16, 17]. Pure natural honey exhibited good antiseptic and antibacterial properties. It was effective in clearing the mixed bacterial load infecting the wounds within seven days.

The clearing of infection observed when honey is applied to a wound may reflect more than just antibacterial properties. Research shows that the proliferation of peripheral blood B-lymphocytes and T-lymphocytes in cell culture is stimulated by honey at concentrations as low as 0.1%, and phagocytes are activated by honey at concentrations as low as 0.1%. Honey (at concentrations of 1%) also stimulates monocytes in cell culture to release cytokines, tumor necrosis factor -alpha (TNF- α), interleukin-1 (IL) and IL-6, which activate the immune response to infection [19, 20].

It is worthy of note that in the study, only oneS of the wounds dressed with honey bled during change of dressing while the wounds treated with Eusol were found to bleed readily during dressings. Honey is tissue-friendly; its antiseptic and wound healing properties, when considered along with its low cost and high availability, make it a good wound dressing agent.

REFERENCES

1. Molan PC. Why honey is effective medicine: its use in modern medicine. Bee world. 1999.6(4): 148-158.
2. Atimomo C.E, Ohwovoriole A.E, and Anyiwo C.E. Wound and Healing Antibacterial Ability of Natural Honey: A pilot study. Nigerian Medical Practitioner. 1990. 20(2): 23-24.
3. Hall M. Minor burns and hand burns: comparing treatment methods. Prof. Nurse.1997. 12 (7): 489-9.
4. Gunther RT. The Greek Herbal of Dioscorides. New York: Hafner, 1934 (reprinted 1959).
5. Molan PC. The antibacterial activity of honey. 1. The nature of the antibacterial activity. Bee World 1992; 73 (1): 5-28.
6. Brady NF, Molan PC, Harfoot C.G. The sensitivity of dermatophytes to the antimicrobial activity of manuka honey and other honey. Pharm Sci 1997; 2-3.
7. Dustmann JH. Antibacterial effect of honey. Apiacta 1979; 14(1): 7-11.
8. Mundo AA, Padilla-Zakour OI, Worobo RW. Growth inhibition of food borne pathogens and food spoilage organisms by select raw honeys. Int J. Food Microbiol 2004 97; 1-8.
9. Efem SEE. Clinical observations on wound healing properties of honey. Br J. Surgery 1988; 76 (7): 679-81.
10. Molan PC, Betts JA. Clinical usage of honey as a wound dressing: an update. J. Wound Care 2004: 13 (9): 353-6.
11. Henriques A, Jackson S, Cooper R and Neil B. Free radical production and quenching in honeys with wound healing potentials. J. Antimicrobial Chemotherapy. 2006. 58, 773-77.
12. Ankra-Badu GA. Sickle cell leg ulcers in Ghana. East African Medical Journal: 1992. 69 (7): 366-9.
13. Godwin DC. Free radicals produced during the oxidation of hydrazines by hypochlorous acid. Chem Res Toxicol .1996. 9 (8): 1333-9.
14. Okeniyi JAO, Olubanjo OO, Ogunlesi TA, et al. Comparison of healing of incised abscess wounds with honey and EUSOL dressing. J Altern Complement Med 2005; 11 (3): 511-13.

15. Bangroo AK, Katri R, Chauhan S. Honey dressing in pediatric burns. J Indian Assoc Pediatr Surg 2005; 10 (3): 172-5.
16. Nagra ZM, Fayyaz GQ, Asim M. Honey dressings; experience at Department of Plastic Surgery and Burns Allied Hospital Faisalabad. Prof Med J 2002; 9 (3): 246-51.
17. Molan PC. The Evidence Supporting the Use of Honey as a Wound Dressing. Int J Low Extrem Wounds. 2006; 5; 40-54.
18. Abbas T. Royal Treat- Living in the Gulf. 1997; 50-1.
19. Abuharfeil N, Al-Ovan R, Abo-Shehada M. The effect of bee honey on the proliferative activity of human B- and T-lymphocytes and the activity of phagocytes. Food Agric Immunol .1999; 11: 169-77.
20. Tonks A, Cooper RA, Price AJ, Molan PC and Jones KP. Stimulation of TNF-alpha release in monocytes by honey. Cytokine 2001; 14 (4): 240-2.

Table 1: Honey dressing group: wound size for weeks 1-6

Age Year	Sex	Ht M	Wt Kg	B.M.I Wt/Ht^2	Wound surface	Primary disease	0	1	2	3	4	5	6
26	M	1.83	78	23.29	Superficial burn Neat	Thermal burn	15.0x10.2	12.4x7.6	9.8x5.2	5.0x3.6	3.4x2.0	0	-
74	M	1.67	110	39.44	Deep infected Necrotic	Uncontrolled Diabetes mellitus	14.3x10.2	14.2x10	13.4x9.8	13x8.6	11.9x7.8	10.7x7.6	10.2x7.1
39	F	1.62	75.4	28.73	Shallow Necrotic and infected	Thermal burn	12.2x11.9	10.9x10	8.6x8.2	6.4x6.1	4.8x4.4	2.6x2.0	0
15	M	1.64	57	21-19	Ragged and Infected	Trauma	8.4x6.1	7.5x4.3	4.8x3.2	3.4x2.0	2.1x0.8	0	-
21	F	1.58	58	23.23	Deep, necrotic and infected	Bed sore	8.0x7.2	7.8x7.0	6.7x6.5	5.5x5.1	3.1x2.9	2.7x2.1	0
27	F	1.70	61	21.11	Superficial neat Wound	Trauma	6.0x45	4.7x3.8	2.1x2.0	1.0x0.8	0	-	-
44	M	1.87	105	30.03	Deep, necrotic and infected	Diabetic with abscess	5.4x4.6	4.4x3.2	3.1x2.5	2.0x1.4	0	-	-
10	M	1.24	27.8	18.08	Deep, ragged and infected	Sickle cell Malleolar ulcer	5.2x4.6	4.9x4.2	4.2x2.4	3.8x2.0	3.2x1.5	2.0x0.7	0
28	M	1.83	76.5	22.84	Deep and ragged but neat	Trauma	4.8x4.1	4.2x3.0	3.8x2.0	3.5x1.8	2.8x1.0	0	-
14	F	1.41	46	23.24	Shallow and neat	Chemical burn	4.5x3.8	3.8x2.7	2.9x2.1	1.6x1.0	0	-	-

BMI=Body Mass Index=Weight (Kg)/Height^2(M); The normal range of BMI is between 20 to 25.

Table 2: Eusol Dressing group: wound size for week 1 -6

Age Year	Sex	Ht M	Wt Kg	B.M.I Wt/Ht^2	Wound surface	Primary disease	0	1	2	3	4	5	6
17	F	1.57	61.2	24.83	Shallow and neat	Superficial burn	14.3x11.1	14x10.8	13.2x10.2	11.6x8.4	10.9x8.0	9.7x7.1	8.4x6.0
24	M	1.55	62.8	26.14	Ragged but neat	Trauma	10.6x7.2	10.2x6.7	8.6x4.8	7.9x4.1	7.3x3.8	6.2x3.2	5.1x2.0
27	F	1.61	64.0	24.69	Shallow and neat	Superficial burn	7.6x5.4	7.1x4.8	6.2x4.4	5.0x3.7	3.6x3.1	2.4x2.1	0
10	M	1.46	48.7	22.85	Shallow and neat	Trauma	5.6x5.2	5.2x4.8	4.7x4.3	4.1x3.7	3.4x2.9	2.4x2.0	0
19	M	1.68	67.2	23.81	Deep and infected	Sickle cell Malleolar ulcer	5.4x4.7	5.1x4.2	4.7x3.7	4.1x3.2	3.6x3.2	3.0x2.7	2.6x2.1
55	M	1.64	96.8	35.99	Ragged, necrotic and infected	Trauma in a diabetic	5.2x4.8	5.0x4.5	4.7x4.2	4.6x4.0	4.2x3.6	3.8x3.4	3.2x2.9

BMI=Body Mass Index=Weight/Height^2