

Turmeric Mixed Honey Topical Application Enhances Healing, is Safe and Economical in Chronic Wounds

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ABSTRACT

BACKGROUND

Turmeric and honey topical application have been separately studied in animal models and few studies on human wounds, and it was found to enhance wound healing. The objectives of this study were to determine the efficacy of topical application of turmeric mixed honey paste for chronic wounds and evaluate healing effect, safety and economy for the patients.

METHODS

60 patients with chronic wounds including diabetic ulcers, non-diabetic bedsores and venous ulcers were divided randomly into 3 equal groups and pattern of wound healing was studied. Saline and petroleum jelly were used in Group A, honey alone in Group B and turmeric with honey paste in Group C. But chronic wounds from malignancy, tuberculosis, eczema, HIV and acute wounds, burns were excluded from this study. The study was done between Sept. 2018 till Feb. 2020 over a period of 18 months. Age of the patients was in the range of 30-70 yrs. (mean 48 years) with 24 females and 36 males. There were 33 diabetic foot ulcers, 6 venous ulcers and 21 number bed sore patients. The mean area of wounds in the three groups was approximately same. All patients were properly explained about the treatment and informed consent was taken. 100 gms of good quality honey was mixed with 10 gms of freshly prepared good quality turmeric powder to make a paste and was sterilized before application. A sample of paste was checked to rule out bacterial contamination. Patients were followed for 2-16 weeks (mean 8 weeks). The percentage of wound contraction and linear wound healing from initial wound edge were calculated using Walker and Mason formula and Gilman's formula respectively. Safety, efficacy and the cost-effectiveness of the three treatment modalities were studied.

RESULTS

There was a significant decrease in the size of the wounds in the form of percentage of wound contraction. Faster linear progression of healing from initial wound margin was seen in turmeric-honey application ($p < 0.0001$). The treatment was economical and without any adverse effects.

CONCLUSIONS

Our findings suggest that topical application of honey with turmeric produces faster wound healing, and is cost-effective and safe.

KEYWORDS

Turmeric, Curcumin, Honey, Chronic, Non-Healing, Wounds, Topical Application

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DOI: 10.18410/jebmh/2020/285

How to Cite This Article:

*Acharya AM, Sunkara SB, Panda BB.
Turmeric mixed honey topical application
enhances healing, is safe and economical
in chronic wounds. J. Evid. Based Med.
Healthc. 2020; 7(28),1342-1347. DOI:
10.18410/jebmh/2020/285*

*Submission 25-04-2020,
Peer Review 29-04-2020,
Acceptance 10-06-2020,
Published 13-07-2020.*

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BACKGROUND

The process of wound healing has 4 stages- haemostasis, inflammation, proliferation and remodelling. Chronic non-healing wounds could result from the abnormal inflammatory response. There is evidence that abundance of neutrophils, in the wounds can delay the wound healing because of the destructive nature.¹

Prevalence of diabetes so also the diabetic non-healing wounds are globally rising. There is estimated 4.4% increase of diabetic cases by 2030 (366 million). Developing countries will have highest increments where prevalence will rise from 4.2% to 6.1%.² Foot ulcers are one of the most common complications of diabetes affecting up to 25% of patients during their lifetime³ and frequently resulting in hospitalization. Approximately one quarter of all hospitalized days for persons with diabetes are related to foot complications.⁴

Similarly bed sores and venous ulcers are other source of chronic wounds which take months to heal and pose an economic burden and decrease the quality of life of the patients. Pressure wounds have shown high prevalence worldwide with added costs in pressure-redistributing equipment and additional nursing time. In addition to high cost, available antibiotics and antiseptics have drawbacks of toxicity, antibiotic- resistance, and hypersensitiveness.

In this context it is imperative to find out alternative products which will have faster wound healing, safe and economical. In recent years studies had been made on turmeric and honey for their wound healing properties. Turmeric, a plant native to India is widely used as a kitchen spice as well as used by Indian ladies as topical application to smoothen skin and beautification since thousands of years. Its use for number of diseases like arthritis, asthma, indigestion, skin diseases had been described in Ayurveda, the ancient Indian medical science. In recent years number of studies had shown 'Curcumin' the active ingredient of turmeric helps in wound healing through its anti-inflammatory and anti-biotic, anti-fungal properties. Chronic wounds have high level of oxygen radicals such as hydrogen peroxide and super-oxides which are detrimental to wound healing. Curcumin has potent antioxidant action and reduce the damage caused by hydrogen peroxide on fibroblasts.⁵ Topical application of curcumin had been found enhancing wound healing in animal modules.^{6,7}

Topical curcumin had showed faster re-epithelization, increase migration of fibroblasts to wound bed, improve vascularization and significant higher collagen content in animal wounds.^{8, 9, 10} Kundu et al had found similar wound healing properties of turmeric and honey.¹¹ Review of literature on wound healing properties of curcumin provides evidence of its ability to enhance granulation tissue formation, collagen deposition, tissue remodelling and wound contraction.¹²

It had been found that raw curcuminoid had less percutaneous absorption. Adari Bhaskar Rao et al had used glucosyl conjugated tetra hydro curcumin application over

wounds created in Wistar rats and had observed better wound healing activities.¹³

In a review literature Ahmad Shah et al had found the potential properties of phytochemicals like turmeric and honey in the healing of wounds.¹⁴ Curcumin gel application had been found to reduce scarring in post-surgical wounds.¹⁵ G. Mahmdi et al had reported faster caesarean wound healing without any adverse effects using turmeric paste.¹⁶

Honey had been extensively studied in healing chronic wounds and burns.¹⁷ Honey has anti-bacterial effects and produce moisturization favouring wound healing.¹⁸ The protease enzyme of honey facilitates debridement of wound¹⁹ and promote angiogenesis with fibroblasts proliferation in human clinical trials.²⁰ Noori S. Al-Waili et al on reviewing literatures had found considerable therapeutic effects of honey on chronic wounds, ulcers and burns. The wound healing properties of honey was found due to stimulation of tissue growth, enhanced epithelialization and minimal scar formation. These effects were ascribed to honey's acidity, hydrogen peroxide, osmotic effect, antioxidant contents and immunity stimulation.²¹

With this background, we designed a study on treatment of chronic wounds applying turmeric mixed honey paste and evaluated the efficacy of wound healing in terms of percentage of wound contraction and linear progression of healing from initial wound margin.

METHODS

60 number of patients having chronic wounds including diabetic ulcers, non-diabetic bedsores and venous ulcers were randomly divided into 3 equal groups and were studied for the rate of wound healing. Chronic wounds from malignancy, tuberculosis, eczema, HIV and acute wounds, burns were excluded from this study. Group A patients were treated with petroleum jelly and saline as control. Group B patients having chronic wounds were treated with honey alone. Group C patients with chronic wounds were treated with turmeric mixed honey cream application. Patients were followed for 2-16 weeks (mean 8 weeks). The percentage of wound contraction and linear wound healing from edge were recorded. The safety, efficacy and the cost-effectiveness of the treatments were studied. The study was done from Sept. 2018 till Feb. 2020 over a period of 18 months. The patients were of the age ranging between 30-70 (mean 48) years with 24 females and 36 males. There were 33 diabetic foot ulcers, 6 venous ulcers and 21 number of bed sore patients. All the patients were properly explained about the treatment and informed consent was taken. Necessary wound debridement, pressure offloading, antibiotics as per culture-sensitive and anti-diabetic drugs for diabetic patients were followed.

100 gm of good quality honey was mixed with 10 gms of freshly prepared good quality turmeric powder and made a paste for application. The paste was sterilized and a sample tested to rule out bacterial contamination. Honey-turmeric paste was applied to dressing gauze pad and the

wound was covered. Direct application of the paste to wound was avoided. Dressing was changed depending upon the exudate. After a short stay in hospital patients were discharged to curtail the hospital expenditures and were explained the dressing procedures to be done at home. They were instructed to come in regular intervals of 1- 2 weeks for check-up at OPD. Initial wound area and perimeter were marked by a marker pen after putting a transparent film over the wound and the film was transferred onto a graph paper for calculation of the area and perimeter of the wound. The procedure was repeated at the next visit of the patient and data were recorded. Wound healing property was evaluated by two methods.

- 1) Percentage of wound contraction was measured using Walker and Mason formula.²²

Percentage of wound contraction =

$$\frac{(\text{Initial area of wound} - \text{nth day area of wound})}{\text{Initial area of wound}} \times 100$$

- 2) Gilman’s linear healing of wound edge: It calculates the average distance wound has healed from initial wound edge to center of the wound.²³

$$D = A/P$$

D= Linear healing in cm, A= Change in area (cm²), P=Mean perimeter of initial and final wound (cm)

Effectiveness and significance of the treatment modalities were compared calculating “p- value” using ‘t score’.

RESULTS

Observation was carried out for 2 to 16 weeks (mean 8 weeks). The mean area and perimeter of initial wound of the patients of each group were calculated and were repeated on every 2 weeks interval. There were no adverse reports in any of the groups using the treatment modalities.

Turmeric with honey had showed proteolytic activity in Group- C patients helping early removal of slough as well as foul odours. Faster wound contraction was observed in Group- C patients with turmeric mixed honey paste application when compared to control Group- A patients receiving petroleum jelly and saline dressings which was statistically significant (P value <0.0001) (Table 2). When compared with Group-B, Turmeric mixed honey treatment still showed better result than only honey application (P value = 0.0224). Employing Gilman’s Linear healing formula it was observed that Group-C patients treated with turmeric mixed honey wound dressing had showed faster healing from wound edge towards center (mean 2.58 cm, SD 0.6 cm) than Group-A and Group-B patients (Table 2) which was statistically significance (P value <0.0001). There were 0.57 cm² per day healing of wound area and 0.046 cm/ day linear progression of healing from initial wound edge on application of turmeric mixed honey in Group-C patients which showed

superior healing effect than the other two modalities (Table 3). The percentage of wound contraction and linear healing of wound has been shown in Figure 1 and graphically depicted for easy comparison of the three modalities of wound treatments in graph 1 and 2 respectively. Comparative wound healing pattern in the three groups has been shown in Figure 2, 3 and 4.

No adverse effects were noticed with application of turmeric plus honey paste on wounds. The mean cost of turmeric-honey paste for the mean period of treatment was INR Rs. 1050 (\$ 13.5) which would had been INR Rs. 9500 (\$ 123.4) for a commonly applied silver containing antiseptic gel. However it was observed that the raw turmeric power was less soluble in honey.

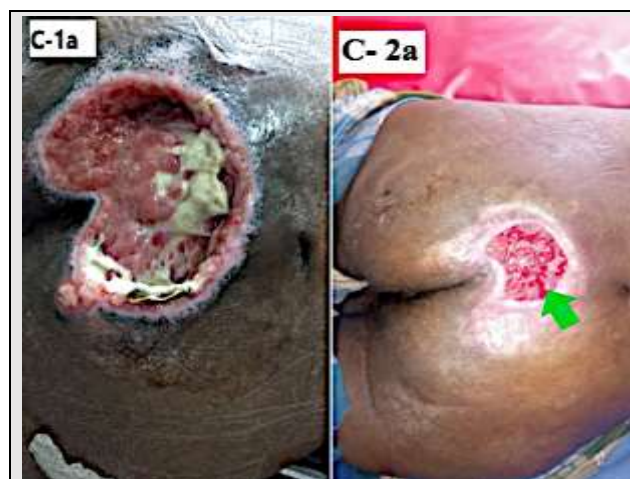


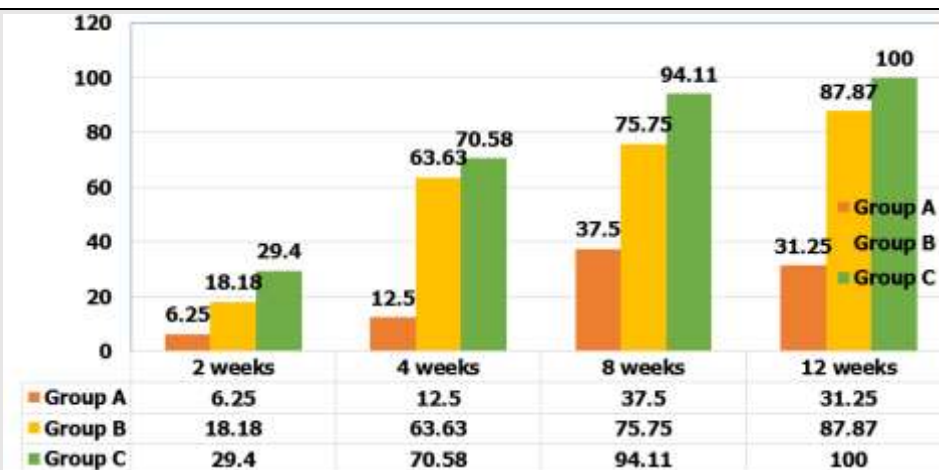
Figure 1. Initial Wound (C-1a) and Wound Contraction with Linear Progression of Healing (Green Arrow) in C-2a with Turmeric Mixed Honey Application



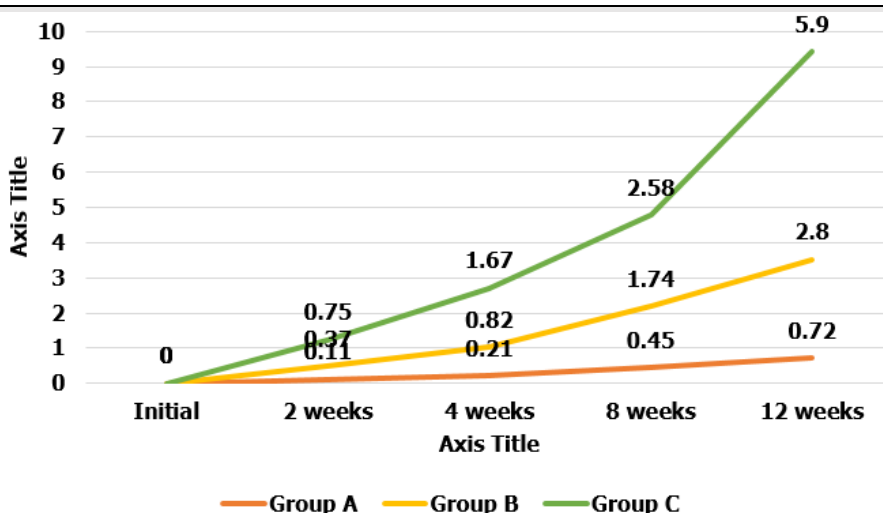
Figure 2. Initial Wound (A-1) and Healing at 8 Weeks (A-2) with Application of Petroleum Jelly and Saline



Figure 3. Initial Wound (B-1) and Healing at 8 Weeks (B-2) with Honey Application



Graph 1. Percentage of Wound Contraction



Graph 2. Linear Healing in Cms

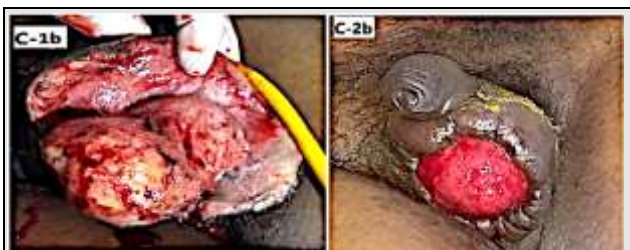


Figure 4. Fournier's Gangrene Initial Wound (C-1b) and Healing with Turmeric Mixed Honey at 8 Weeks (C-2b)

Group	Initial Wound Area in cm ²	8 th Week Wound Area cm ²	S.D.	Initial Perimeter cm	8 th week Perimeter cm	S.D.
A (n=20)	32	24	4.70	20	15	0.4
B (n=20)	33	8	11.86	20.2	8.4	1.2
C (n=20)	34	2	14.33	20.3	4.5	1.4

Table 1. Wound Area and Perimeter

Group	% of Wound Contraction	S.D.	Linear Healing in cm	S.D.
A (n=20)	25	11.15	0.45	0.02
B (n=20)	75.75	23.89	1.74	0.4
C (n=20)	94.11	29.87	2.58	0.6

Table 2. Mean % of Wound Contraction and Linear Healing at 8th Week

Group	Mean Area Healed per Day (cm ² /day)	Mean Linear Healing from Edge (cm/day)
A	0.14	0.008
B	0.44	0.031
C	0.57	0.046

Table 3. Per Day Healing

DISCUSSION

Our study of turmeric mixed honey paste had showed faster wound healing due to early epithelialization, granulation tissue formation and wound contraction. The proteolytic enzymes of honey had helped in early slough removal. Its hyper osmolarity did not allow organism to grow. This view is supported by findings of others.^{19,24} The combined paste had showed powerful deodorant property as the foul smell of infected diabetic wounds and bed sores was removed quickly. Most of the available studies were on animal modules. Available studies on human wounds were either on use of turmeric or honey alone. G Mahamudi et al had reported effective healing of caesarean scar with turmeric paste.¹⁶ Combination of silver-curcumin hydrogels has been shown superior to use of curcumin and silver gels alone.²⁵ Honey based hydrogel had been shown to accelerate re-epithelialization on burn wound.²⁶ In a review article

Fahmida Alam et al had published the potential therapeutic use of honey on diabetic wounds. Vijay Viswanathan, Rajesh Keshavan et al had observed a polyherbal formulation containing turmeric was effective as well as safe in healing diabetic foot ulcers like the standard silver sulphadiazine cream.²⁷ We observed that turmeric mixed honey had cumulative healing effect that helped in faster wound contraction and linear healing from wound edge. The per day healing rate of the chronic wounds with turmeric plus honey paste in term of area (0.57 cm²/ day) and linear healing progression from wound edge (0.046 cm /day) were found superior than placebo as well as single use of honey (Table 3). The turmeric mixed honey application was found safe as well as less costly in the long run of treatment for chronic wounds. It is like a poor people's antiseptic ointment. The limitations of the paste was that raw turmeric powder was less soluble in honey.

CONCLUSIONS

Use of turmeric with honey produce faster wound healing, and is cost-effective and safe. However, good wound care practices including early debridement, infection control, and measures to lower direct pressure over the wounds play an important role in healing. Raw turmeric (curcuminoid) is slowly absorbed. Refined curcumin combined with honey in the form of gels, collagen films, alginate foams can enhance wound healing.

Ethical Approval

Ethical approval was obtained from the Ethical Committee of Hi-Tech Medical College and Hospital.

REFERENCES

- [1] Menke NB, Ward KR, Witten TM, et al. Impaired wound healing. *Clin Dermatol* 2007;25(1):19-25.
- [2] Wild S, Roglic G, Green A, et al. Global prevalence of diabetes estimates for the year 2000 and projection for 2030. *Diabetes Care* 2004;27(5):1047-1053.
- [3] Armstrong DG, Lavery LA, Harkless LB. Validation of a diabetic wound classification system. The contribution of depth, infection and ischemia to risk of amputation. *Diabetes Care* 1998;21(5):855-859.
- [4] Allman RM. Pressure ulcers among the elderly. *N Engl J Med* 1989;320(13):850-853.
- [5] Gadekar R, Saurabh MK, Thakur GS, et al. Study of formulation, characterization and wound healing potential of transdermal patches of curcumin. *Asian J Pharm Clin Res* 2012;5:225-230.
- [6] Mohanty C, Sahoo SK. Curcumin and its topical formulations for wound healing applications. *Drug Discov Today* 2017;22(10):1582-1592.
- [7] Biswas TK, Mukherjee B. Plant medicine of Indian origin for wound healing activity: a review. *Int J Low Extremity Wounds* 2003;2(1):25-39.
- [8] Agarwal BB, Sung B. Pharmacological basis for curcumin in chronic diseases and age old spice with modern targets. *Trends Pharmacol Sci* 2009;30(2):85-94.
- [9] Kohli K, Ali J, Ansari MJ, et al. Curcumin: a natural anti-inflammatory agent. *Indian J Pharmacol* 2005;37(3):141-147.
- [10] Sidhu GS, Mani H, Gaddipati JP, et al. Curcumin enhances wound healing in streptozotocin induced diabetic rats and genetically diabetic mice. *Wound Repair Regen* 1999;7(5):362-374.
- [11] Kundu S, Biswas TK, Das P, et al. Turmeric (*Curcuma Longa*) rhizome paste and Honey show similar wound healing potential: a preclinical study in Rabbits. *Int J Low Extrem Wounds* 2005;4(4):205-213.
- [12] Akbik D, Ghadiri M, Chrzanowski W. Curcumin as a wound healing agent. *Life Sciences* 2014;116(1):1-7.
- [13] BhaskarRao A, Prasad E, Deepthi SS, et al. Wound healing: a new prospective on glucosylated tetrahydro curcumin. *Drug Des Devel Ther* 2015;9:3579-3588.
- [14] Shah A, Amini-Nik S. The role of phytochemicals in the inflammatory phase of wound healing. *Int J Mol Sci* 2017;18(5):1068.
- [15] Heng MCY. Wound healing in adult skin: aiming for perfect regeneration. *Int J Dermatol* 2011;50(9):1058-1066.
- [16] Mahmudi G, Nikpour M, Azadback M, et al. The impact of turmeric cream on healing of caesarean scar. *West Indian Med J* 2015;64(4):400-406.
- [17] Honey MJ. An immune-modulatory in wound healing. *Wound Repair Regen* 2014;22:187-192.
- [18] Blair SE, Cokcetin NN, Harry EJ, et al. The unusual antibacterial activity of medical-grade leptospermum honey: antibacterial spectrum, resistance and transcriptome analysis. *Eur J Clin Microbiol Infect Dis* 2009;28(10):1999-1208.
- [19] Alam F, Islam MA, Gan SH, et al. Honey: a potential therapeutic agent for managing diabetic wounds. *Evid Based Complement Altern Med* 2014;2014:169130.
- [20] Molan PC. Potential of honey in the treatment of wounds and burns. *Am J Clin Dermatol* 2001;2(1):13-19.
- [21] Al-Waili NS, Salom K, Al-Ghamdi AA. Honey for wound healing, ulcers and burns: data supporting its use in clinical practice. *The Scientific World Journal* 2011;11:766-788.
- [22] Walker HL, Mason AD Jr. A standard animal burn. *J Trauma* 1968;8(6):1049-1051.
- [23] Gilman TH. Parameter for measurement of wound closure. *Wounds* 1990;2(3):95-101.
- [24] Molan PC. The evidence supporting the use of Honey as a wound dressing. *The Int J Lower Extremity Wounds* 2006;5(1):40-54.
- [25] Varaprasad K, Vimala K, Rabindra S, et al. Fabrication of silver nano-composite films impregnated with curcumin for superior antibacterial application. *J Mater Sci Mater Med* 2011;22(8):1863-1872.

[26] Md. Zohdi R, Zakaria ZAB, Yusof N, et al. Gelam Honey-based hydrogel as burn wound dressing. *Evid Based Compliment Altern Med* 2012;2012:843025.

[27] Viswanathan V, Keshavan R, Kavitha KV, et al. A pilot study on the effects of a polyherbal formulation cream on diabetic foot ulcers. *Indian J Med Res* 2011;134(2):168-173.