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Applying honey dressings to non-healing wounds in elderly persons receiving home care

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ABSTRACT

Objective: The study aimed to determine the clinical effectiveness of honey dressings in the management of non-healing wounds in elderly persons receiving home care.
Material and methods: Design: a prospective interventional study. The sample comprised 40 Czech home care clients (aged over 65 years) with non-healing wounds who were randomly assigned to two groups. Wounds were treated with honey (intervention group) or conventional (controls) dressings. Each wound was studied for three months. A detailed description of a wound (location, size, wound bed, edges, amount of exudate, odor, adjacent skin) were recorded. Wounds were assessed with the Wound Healing Continuum and pain intensity with the Visual Analog Scale.
Results: Over the 3-month period, 16 (80%) individuals in the intervention group had their wounds completely healed, as compared with only six (30%) controls. There was no statistically significant difference in wound size between the groups on Day 1 ($p = 0.1801$). Ninety days later, the difference in wound size between the groups was statistically significant ($p = 0.0041$). There was a statistically significant difference in pain intensity between the two groups ($p = 0.0007$), with higher pain scores being indicated by controls.
Conclusion: The study results showed that the application of honey dressings to non-healing wounds resulted in faster healing, wound size reduction and lower pain intensity.

1. Introduction

Non-healing wounds have been a hot issue. They are often encountered in the elderly, which may be explained by both involutional changes at an old age and the higher prevalence of comorbidities or immobility. Any wound that won't heal is unpleasant, bothersome and painful for the patient as well as expensive to manage.

A current trend in the management of non-healing wounds is the use of the so-called wet therapy. Alternative materials that may be used at any treatment stage are honey dressings. Although not commonly used in the Czech Republic, these dressings were found beneficial in numerous studies [1].

Since ancient times, honey has been used as a treatment; its therapeutic mechanisms and effects have been confirmed by many clinical studies [2,3,4,5,6,7,8,9]. It may successfully be applied to skin damaged by burns or limb amputations as well as to pressure ulcers, lower leg ulcers and surgical wounds [10,11]. Honey has a positive impact on healing through its antimicrobial, antioxidant, antiinflammatory and immunomodulatory properties. It also boosts the immune system's activity, promotes debridement and stimulates the wound regeneration process [12]. The suitability of honey for wound management stems from its composition and physical properties. The high sugar content has an osmotic effect reducing bacterial multiplication and growth. Lymph is moved from the subcutaneous tissue to the wound surface, aiding in the removal of necrotic and devitalized tissue [13,14]. The antimicrobial activity of honey results also from the low pH (3.2–4.5). The antioxidant activity comes from the presence of various compounds in honey, with the strongest antioxidants being phenolic substances and gallic acid [12].

Studies have shown the effectiveness of honey topically applied to non-healing wounds in both prospective [15–19] and randomized controlled studies [20,21,22,23,24,25,26,27]. The importance of the issue is underlined by the fact that in 2008–2017, several systematic reviews on the effects of honey topically applied to non-healing wound of various etiology have been published [2–4,6–8]. In the Czech Republic, no study on this treatment approach has been conducted.

In the Czech Republic, non-healing wounds are managed by professionals in various specialties such as surgeons, diabetologists,

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internists, geriatricians, as well as by general practitioners. In patients with impaired mobility cared for at home, wounds are managed and dressings are changed by qualified general nurses working in home care agencies, in cooperation with general practitioners or the above specialists.

Therefore, the present study focused on comparing the effectiveness of honey dressings and those containing other materials (povidone-iodine, nanocrystalline silver and hydrogel) in the management of non-healing wounds in elderly persons receiving home care.

2. Methods

2.1. Design

A prospective interventional study.

2.2. Sample and setting

The study was carried out from March 2017 to February 2018 in Czech elderly with non-healing wounds cared for in their homes by a selected home care agency. The inclusion criteria were giving written consent to participate, age over 65 years, being a client of a selected home care agency in the Olomouc Region, Czech Republic and having non-healing wounds of various etiology (pressure ulcers, lower leg ulcers or diabetic ulcers). The exclusion criteria were having allergy to honey, bee venom or products and refusing to participate in the study. Selection bias was eliminated by simple randomization of sample.

The subjects were randomly assigned to the groups in the order in which they entered the study. The first participant entering the study was assigned to the intervention group, the second to the control group and the others were alternately divided into the two groups. Eligible for the study were 46 elderly persons; of those, two were excluded from intervention group due to their inability to tolerate dressings applied to wounds (pain and burning in the wound longer than 2 h) and four died of primary diseases not associated with non-healing wounds. Eventually, the sample comprised 20 elderly persons in an intervention group and 20 elderly controls. The sample size was influenced by availability of patients with non-healing wounds in a selected home care agency during period of conducted study.

The wounds of participants in the intervention group were managed with honey dressings (namely Actilite, containing 99% manuka honey and 1% manuka oil). Controls were treated with materials containing povidone-iodine, nanocrystalline silver or hydrogel. All wounds were cleansed with wound care solutions (Dermacyn, Prontosan). When needed autolytic debridement was performed. All wounds included in the study were managed by the same home care agency nurse, a specialist in wound management, who also assessed each wound upon dressing change.

2.3. Data collection

The study monitored the course and duration of wound healing. Each wound was studied for three months; monitoring was terminated if wounds healed earlier, that is, a scar formed.

Initially, the person's history, detailed wound description and type of management were recorded; the wound was also documented with photographs. Then, during each dressing change, the condition of the wound and dressing material needed were recorded. Photographs were taken by the same nurse every ten days. The record form contained the following components of wound assessment: location, size, wound bed condition, Wound Healing Continuum (WHC), amount and color of exudate, odor, description of the wound edges and adjacent area, pain, other complaints and Photographic Wound Assessment Tool (PWAT). In all participants, wounds were classified by the color of the wound bed with the WHC instrument. Two raters independently assessed wounds using photographs and the PWAT. The scale includes six domains (wound edges, necrotic tissue type and amount, skin color surrounding the wound, granulation tissue type and epithelization). Each domain is assigned 0 to 4 points, with lower scores meaning better condition of the wound [28].

Table 1
Sample description.

Characteristic		Intervention group (n = 20)		Control group (n = 20)		p-value
		number	%	number	%	
Gender	male	5	25%	13	65%	0.011[a]
	female	15	75%	7	35%	
Disease	hypertension	7	35%	11	55%	0.204[a]
	cardiovascular disease	17	85%	19	95%	0.605[a]
	peripheral vascular disease	10	50%	14	70%	0.197[a]
	malnutrition	4	20%	2	10%	0.376[a]
Diabetes mellitus	no	9	45%	7	35%	0.519[a]
	for over 5 years	11	55%	13	65%	
Wound type	pressure ulcer	7	35%	2	10%	0.265[b]
	lower leg ulcer	9	45%	13	65%	
	diabetic foot syndrome	4	20%	5	25%	

[a] Chi-square test.
[b] Fisher's exact test.

2.4. Data analysis

The sample was described using descriptive statistics. Hypotheses were evaluated with the chi-square test or, if the conditions for its use were not met, Fischer's exact test. Further, the Mann-Whitney *U* test was applied. Statistical tests were performed at a significance level of 5%. Data were processed with Stata v. 13.

3. Results

The sample description is provided in Table 1. Both groups were comparable with regard to demographic characteristics, concomitant diseases, wound etiology and size. The mean age of subjects in the intervention group was 83 (± 9.07) years, with females being the majority. The mean age of controls was 76 (± 8.22) years; there were more males. The prevalence of concomitant diseases was almost identical in the two groups, with cardiovascular disease being most common; there were no statistically significant differences in the prevalence of concomitant diseases between the groups. Neither were there differences in diabetes mellitus; most subjects in both groups had had diabetes mellitus for more than five years.

The percentages of non-healing wound types were approximately the same in both groups. In the entire sample, lower leg ulcers were most frequent, being present in nine (45%) and 13 (65%) individuals in the intervention and control group, respectively. All ulcers were of venous origin. There were seven (35%) subjects with pressure sores in the intervention group, as compared with only two (10%) controls. Pressure ulcers were stage 2–4 according to the European Pressure Ulcer Advisory Panel classification. In the group treated with honey dressings, the least common were diabetic ulcers, seen in four individuals (20%); those were present in five (25%) controls. Based on the Wagner classification system, all diabetic ulcers were grade 2 or 3. The duration of non-healing wounds in intervention group at the beginning of study was 3.5 months, while in control group 5 months. The average frequency of wound dressings in intervention group during study was 23.9 (SD 10.46, min. 5, max. 40), while in control group 40.5 (SD 18.08, min. 18, max. 90). The difference in dressing frequency between both groups was statisticaly significant ($p = 0.0004$).

Wound bed condition was assessed with the WHC instrument. In

Table 2
Wound beds assessed with WHC.

Assessment	WHC	Intervention group (n = 20)		Control group (n = 20)	
		Number	%	Number	%
Day 1	black	3	15%	3	15%
	black/yellow	3	15%	2	10%
	yellow	3	15%	4	20%
	yellow/red	7	35%	8	40%
	red	2	10%	3	15%
	red/pink	2	10%	0	0%
	pink	0	0%	0	0%
Day 40	black	0	0%	2	10%
	black/yellow	2	10%	0	0%
	yellow	0	0%	1	5%
	yellow/red	3	15%	8	40%
	red	4	20%	6	30%
	red/pink	3	15%	1	5%
	pink[a]	8	40%	2	10%

[a] Subjects with wounds healed by Day 40 were classified as category 7 (pink).

both groups, yellow/red was the most common color of the wound bed. On Day 40, the most common colors were pink in the intervention group and yellow/red and red in controls (Table 2). The difference between the groups was not statistically significant (Fischer's exact test, $p = 0.106$).

Initially, the mean wound size was similar in both groups. There was no statistically significant difference in wound size between the groups on Day 1 ($p = 0.1801$). Ninety days later, the difference in wound size between the groups was statistically significant ($p = 0.0041$). At the end of the observation period, the mean size of wounds was smaller in subjects with honey dressings than in controls with conventional dressings. In the intervention group, the mean wound size decreased from 15.7 cm^3 on Day 1–6.0 cm^3 on Day 90. In controls, the mean wound size decreased from 16.9 cm^3 to 9.8 cm^3 over the 3-month period (Table 3).

The numbers of wounds completely healed over the observation period are shown in Table 4. Among subjects treated with honey dressings, 16 (80%) had their wounds completely healed within three months, as compared with only six (30%) controls.

Pain intensity was evaluated on the 0 to 10 Visual Analog Scale (VAS), where 0 indicates no pain and 10 denotes the worst possible scale. Scores of 0–3 were considered as reduced pain. Initially (Day 1), there was no statistically significant difference in pain intensity between the groups ($p = 0.1516$). As early as on Day 20, the difference in wound pain intensity between both groups was statistically significant ($p = 0.0007$), with higher pain scores being indicated by controls (Table 5). Another parameter studied was wound odor. This was more successfully removed in the intervention group, with no odor being noted in 15 (75%) of the wounds, as compared with only 2 (10%) wounds in controls ($p < 0.001$).

Table 4
Differences in wound healing between groups.

Group	Intervention group (n = 20)		Control group (n = 20)		p-value
Complete wound healing within 3 months	Number	%	Number	%	
No	4	20%	14	70%	0.011[a]
Yes	16	80%	6	30%	

[a] Chi-square test.

4. Discussion

The study aimed to determine the clinical effectiveness of honey dressings in the management of non-healing wounds of various etiology in elderly persons receiving home care. Healing of lower leg ulcers of various etiology was studied by authors in other countries, for example [15] in Germany [19], in Belgium [17], in Qatar or [18] in Portugal.

In the present prospective interventional study, the wound bed and size, duration and course of healing and pain intensity were assessed in the elderly participant's wounds. Each wound was studied for three months. During that period, the effectiveness of various materials used to manage wounds could be seen. In the group treated with honey dressings (Actilite), wounds were completely healed in 16 (80%) individuals, as compared with only six (30%) controls. Moreover, the wound size in the intervention group decreased significantly.

Honey is one of naturally occurring remedies that have been applied in the treatment of wounds. It promotes faster wound healing through its regenerative tissue growth and epithelization effects, with little or no formation of scars [29].

The positive effect of manuka honey on faster healing of neuropathic diabetic foot ulcers was also reported in a Greek randomized controlled trial by Ref. [24]. Similarly [22], in their randomized controlled trial showed that honey-impregnated dressings significantly reduced the healing time of diabetic foot ulcers when compared to conventional techniques. In their systematic review [4], concluded that honey heals both acute and non-healing wounds more quickly than dressings treated with silver and povidone-iodine; honey dressings facilitate faster healing of burns and are more effective in infected postoperative wounds.

The accelerative effect of honey in the wound, ulcer and skin burn healing process is related to its physical properties of hygroscopicity, hypertonicity, lower pH and complex chemical composition [29].

Another studied parameter was the wound bed. Studies by other authors have confirmed that honey is effective in removing slough and necrosis from the wound bed [15,16,24]. The present study, however, failed to find a statistically significant difference in how quickly the wound bed became clean between the two groups, even though wound bed condition did improve over the observation period, especially in the intervention group managed with honey dressings. Wound bed condition was assessed with the WHC instrument.

Another objective was to study the analgesic effect of honey

Table 3
Differences in wound size between groups.

Time	Group	Wound size (cm^3)						p-value[a]
		Number	Median	Arith. mean	SD	Min.	Max.	
Day 1	Intervention group	20	3	15.7	34.67	0.05	150	0.1801
	Control group	20	6	16.9	25.62	0.24	96	
Day 90	Intervention group	20	0	6.0	19.56	0	80	0.0041
	Control group	20	0.4	9.8	18.44	0	70	

[a] Mann-Whitney *U* test.

Table 5
Differences in pain intensity between groups.

Time	Group	Pain intensity – VAS						p-value[a]
		Number	Median	Arith. mean	SD	Min.	Max.	
Day 1	Intervention	20	3	3.3	1.53	1	8	0.1516
	Control	20	4	3.9	1.59	1	6	
Day 20	Intervention	20	2	1.7	1.53	0	5	0.0007
	Control	20	3.5	3.8	1.70	1	6	

[a] Mann-Whitney *U* test.

dressing in comparison with controls. Non-healing wounds are often accompanied by pain, in this context referred to as chronic. Pain negatively affects the process of wound healing, particularly by prolonging the inflammatory phase through increasing blood pressure and stress hormone levels. The antiinflammatory effects of honey contribute to a lower number of inflammatory cells, decreased vasodilation and edema, increased blood and nutrient supply to the wound and less pain [13]. In the present study, reduced pain during dressing change was reported by patients treated with honey dressings as early as on Day 20, with their mean VAS score dropping from 3.3 on Day 1 to 1.7 on Day 20. In controls, the mean VAS score only decreased from 3.9 to 3.9. Similar findings were reported by Refs. [15,21]. In their prospective study on the effect of honey on pain reduction during therapy [15], found that the mean intensity of pain as reported by patients significantly decreased from 1.71 at the beginning to 0.55 at the end of the study. A randomized controlled trial by Ref. [21] also assessed pain using the VAS, with the initial score 7 dropping to 1 in the intervention group and 5 in controls. Honey dressings proved more effective in reducing wound pain.

The first Czech study on the effects of honey dressing on wound healing confirmed the positive impact of honey on non-healing wounds of various etiology in a sample of elderly persons receiving home care, in particular the course and duration of healing and wound pain intensity. The outcomes of this study, as well as other systematic reviews and clinical studies, should contribute to greater credibility of honey dressings and their more frequent use in the management of non-healing wounds.

4.1. Limitations

The main limitation of the study was a small sample size, wound heterogeneity and a short monitoring period. Therefore, further research is needed, with more subjects and a longer time of monitoring of wound healing; alternatively, it should focus on elderly persons with wounds of the same etiology.

5. Conclusion

The study results have shown that the application of honey dressings is beneficial to the healing process. In the intervention group, treatment of non-healing wounds with honey dressings resulted in a higher number of completely healed wounds, faster wound size reduction, less intense wound odor and reduced wound pain intensity.

Ethical aspects

The study was conducted after written consent was obtained from the home care agency and physicians in charge of its clients. It was approved by the University Hospital Olomouc and University of Ostrava Faculty of Medicine ethics committees. The subjects gave their written consent to participate in the study.

Declarations of interest

None.

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References

[1] Vyhlídalová D, Kozáková R, Zeleníková R. Management of non-healing wounds with honey dressings: a literature review. Cent Eur J Nurs Midwifery 2018;9(3):880–8. https://doi.org/10.15452/CEJNM.2018.09.0019.
[2] Asamoah B, Ochieng B, Meetoo D. The clinical role of honey in treating diabetic foot ulcers: a review. Diabetic Foot Canada 2014;2(2):30–4.
[3] Holland L, Norris J. Medical grade honey in the management of chronic venous leg ulcers. Int J Surg 2015;20(4):17–20.
[4] Jull A, Cullum N, Dumville JC, et al. Honey as a topical treatment for wounds (Review). Cochrane Database Syst Rev 2015;3(CD005083). https://doi.org/10.1002/14651858.CD005083.pub4.
[5] Lee D, Sinno S, Khachemoune A. Honey and wound healing: an overview. Am J Clin Dermatol 2011;12(3):181–90.
[6] Medhi B, Puri A, Upadhyay S, et al. Topical application of honey in the treatment of wound healing: a metaanalysis. Altern Med 2008;10(4):166–9.
[7] Tian X, Li JY, Ma L, et al. Effects of honey dressing for the treatment of DFUs: a systematic review. Int J Nurs Sci 2014;1(2):224–31.
[8] Vandamme L, Heyneman A, Hoeksema H, et al. Honey in modern wound care: a systematic review. Burns 2013;39(8):1514–25.
[9] Watts R, Frehner E. Evidence Summary: wound management: medical-grade honey. Wound Pract Res 2017;24(1):61–4.
[10] Boateng J, Catanzano O. Advanced therapeutic dressings for effective wound healing: a review. J Pharm Sci 2015;104(11):3653–80.
[11] Labban L. Honey as a promising treatment for diabetic foot ulcers (DFU). J Med Soc 2014;28(2):64–8.
[12] Oryan A, Alemzadeh E, Moshiri A. Biological properties and therapeutic activities of honey in wound healing: a narrative review and meta-analysis. J Tissue Viability 2016;25(1):1–21.
[13] Alam F, Islam A, Gan SH, et al. Honey: a potential therapeutic agent for managing diabetic wounds. Evid Based Complement Altern Med 2014:1–16. Article ID 169130.
[14] Molan P. Using honey in wound care. Int J Clin Aromather 2006;3(2):21–4.
[15] Biglari B, Moghaddam A, Santos K, et al. Multicentre prospective observational study on professional wound care using honey. Int Wound J 2013;10(3):252–9.
[16] Moghazy A, Shams ME, Adly OA, et al. The clinical and cost effectiveness of bee honey dressing in the treatment of diabetic foot ulcers. Diabetes Res Clin Pract 2010;89(3):276–81.
[17] Mohamed H. The efficacy and safety of natural honey on the healing of foot ulcers: a case series. Wounds 2015;27(4):103–14.
[18] Tellechea O, et al. Efficacy of honey gel in the treatment of chronic lower leg ulcers: a prospective study. EWMA J 2013;13(2):35–9.
[19] Vandeputte J. Clinical evaluation of L-Mesitran – a honey-based wound ointment. Prof Nurs Today 2007;11(2):26–31.
[20] AL Saeed M. Therapeutic efficacy of conventional treatment combined with Manuka honey in the treatment of patients with diabetic foot ulcers: a randomized controlled study. Egypt J Hospital Med 2013;53(4):1064–71.
[21] Gulati S, Qureshi A, Srivastava A, et al. A prospective randomized study to compare the effectiveness of honey dressing vs. povidone iodine dressing in chronic wound healing. Indian J Surg 2014;76(3):193–8.
[22] Imran M, Hussain M, Baig M. A randomized, controlled clinical trial of honey-impregnated dressing for treating diabetic foot ulcer. J Cutan Anesth Surg 2015;25(10):721–5.
[23] Jull A, Walker N, Parag V, et al. Randomized clinical trial of honey-impregnated dressings for venous leg ulcers. Br J Surg 2008;95(2):175–82.
[24] Kamaratos A, et al. Manuka honey-impregnated dressings in treatment of

neuropathic diabetic foot ulcers. Int Wound J 2014;11(3):259–63.
[25] Lund-Nielsen B, Adamsen L, Kolmos HJ, et al. The effect of honey-coated bandages compared with silver-coated bandages on treatment of malignant wounds – a randomized study. Wound Repair Regen 2011;19(6):664–70. https://doi.org/10.1111/j.1524-475X.2011.00735.x.
[26] Shukrimi A, Sulaiman AR, Halim AY, et al. A Comparative study between honey and povidone iodine as dressing solution for Wagner type II diabetic foot ulcers. Med J Malaysia 2008;63(1):44–6.
[27] Tsang K, Wai-Yung Kwong E, Shing-Shung To T, et al. A pilot randomized, controlled study of nanocrystalline silver, Manuka honey, and conventional dressing in healing diabetic foot ulcer. Evid Based Complement Altern Med 2017;2017:5294890. 15 pages https://doi.org/10.1155/2017/5294890.
[28] Houghton P, Kincaid CB, Campbell KE, et al. Photographic assessment of the appearance of chronic pressure and leg ulcers. Ostomy/Wound Manag 2000;46(4):20–30.
[29] Abeshu MA, Geleta B. Medicinal uses of honey. Biol Med (Aligarh) 2016;8(2):279. https://doi.org/10.4172/0974-8369.1000276.