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Review Article

Treatment with A Primary Wound Spray Based on St John's Wort Oil and Neem Oil: Short Report of Three Diabetic Foot Ulcer Cases from Vietnam

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Abstract

Wound care represents a large component of the ever-increasing workload of healthcare professionals in the community, hospitals and long-term care centres. The need for a cost-effective wound dressing that can be used on a variety of wounds and that meets multiple requirements e.g. acting anti-microbial, providing peri-wound protection and maceration control, preserving moisture balance and strengthening the skin's barrier function, is well recognised. Choosing the correct dressing optimises the wound healing process and decreases healing time. Moreover, it can ease the work of health care professionals and improve patients' quality of life.

This short case study report focusses on the application of a plant-derived wound spray based on St John's wort oil and Neem oil in diabetic foot ulcer (DFU) patients. Attention is paid to clinical efficacy, feasibility and user experiences. Overall, the results indicate that this wound spray may be an effective treatment option in DFUs. Application of the spray offers a promising non-invasive approach to support the physiological wound healing processes in a very feasible way for both patients and professionals. Larger and more rigid longitudinal studies with a randomised controlled design are needed to confirm the efficacy of this innovative product in DFU patients.

Introduction

Today, a large variety of wound dressings exists to support a good wound healing process.

The novel treatment studied in this article involves the application of a plant-derived wound spray based on St John's wort oil and Neem oil [1]. This spray acts as a primary wound dressing and is applied from a distance of 5-10 cm directly onto the wound surface and peri-wound skin, after which it creates a thin layer of oil covering the wound bed and the surrounding skin. The spray thereby creates a non-adherent wound coverage, which facilitates wound healing since damage of the granulation tissue and regenerating epithelium during dressing change is prevented. The oily spray creates a sustaining moist wound environment due to reduced water evaporation from the wound. A moist environment is known to support wound healing. In addition, the spray exerts an antimicrobial effect based on a physical mode of action due to its high content of unsaturated fatty acids [2,3]. Finally, the spray protects also the skin area around the wound and supports a healthy skin barrier function [4].

The spray can be used for acute and chronic wounds and in all health care settings including the patients' home [5].

This short case series describes 3 diabetic foot ulcer (DFU) cases of patients from Vietnam in which this innovative wound spray was applied to treat their wounds. Special attention was paid to the effect of the spray on wound healing, its feasibility for use in daily wound care practice and the patients' and professionals' satisfaction with the product.

Methods

Design: case study following a uniform structured approach.

Inclusion: adult patients (> 18 y) with a confirmed diagnosis of DFU. An informed consent procedure was followed.

Intervention: the studied wound spray based on St John's wort oil and Neem oil was applied as a primary wound dressing following informed instructions. Prior to the application of the wound spray, all wounds were thoroughly cleaned, surgically sharp debrided and rinsed with normal saline 0,9%. The wound spray was evenly applied to cover the entire wound surface area (WSA) and protected with a layer of sterile non-woven gauze.

Data collection:

A structured Wound Case Study Form was used to gather all relevant study data.

General and patient related data involved: demographic data and patient related data (age, gender, main diagnosis, comorbidity, wound healing affecting medication, ADL (care dependent or not) and activity level (Braden score: bedfast, chairfast, walks occasionally, walks frequently); treatment setting (patient's home, hospital, nursing home, assisted living) and type of caregiver (professional, non-professional, self-administering, informal caregiver).

DFU data involved: location, duration of existence and severity (Wagner classification: grade I, II, III, IV, V) [6], wound bed preparation (WBP) [7,8], cleansing, primary and secondary dressings prior to the application of the wound dressing spray.

Outcome data (at start of application of the wound spray and weekly during maximum 6 weeks treatment period until complete healing or partial healing had occurred): WSA (maximum length x maximum width in cm^2), type of secondary dressing, and a photo of the wound (including a measurement strip), always made in the same way (from the same distance) and with preferably the same background.

Data at stop of application of the wound spray: extent of healing process (partial of complete healing), WSA, WSA decrease and total amount of wound spray application days.

Additional data: wound spray related adverse events (AE), if any, were documented. Feasibility of applying the wound spray was assessed via a scale ranging from 0 = hard to use to 10 = very easy to use, and patient's and caregiver's appreciation of the wound spray were measured via a 5-item scale (bad-moderate-good-very good-excellent).

Results

The 3 included longitudinally studied cases were conducted in different care settings. One patient was treated at home, one in hospital, and one started treatment in hospital and continued it at home.

All participants were female, on average 73,6 years old and suffering from type II diabetes treated with medication. They were all more or less care dependent and regarding mobility, 2 were chairfast and 1 walked occasionally.

Their wounds were respectively located in the medial foot (N=1, toe 1) and lateral foot (N=2, toe 4 and 5). The 3 wounds existed between 4 and 12 weeks. In all cases wound care was executed by a professional.

The demographic and patient related data of the participants are presented in Table1.

The WSAs varied between 1 and 21 cm^2. After applying the wound spray, a secondary dressing was used in all patients (a non-woven gauze). One wound completely healed in 42 days. Two wounds partially healed in 42 and 28 days with a WSA decrease of 93% and 75% respectively. The induction of granulation tissue formation was impressive, resulting in progressive filling up of the wounds and finally in re-epithelialization. The results with the wound spray are depicted in Table 2.

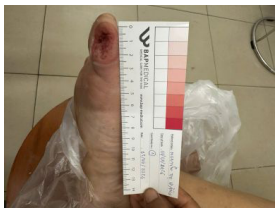
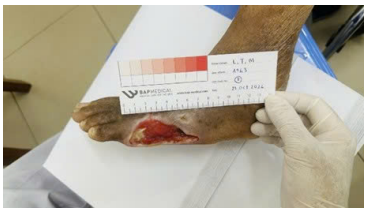
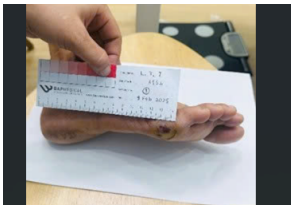
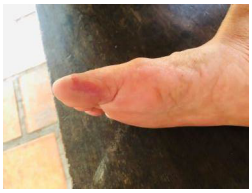
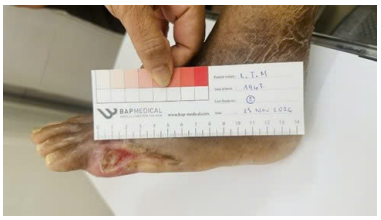
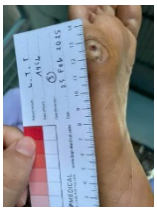
In all 3 cases no wound spray related adverse events were reported. The feasibility of application of the wound spray was rated as high in all cases. The patients' appreciation of the wound spray was rated "*very good*", the caregivers' appreciation was rated "*excellent and very good*". These results are shown in Table 3.

	Case 1	Case 2	Case 3
Age (year of birth)	1956	1944	1954
Gender	female	female	female
Main diagnosis	Type II diabetes	Type II diabetes	Type II diabetes
Comorbidity	Hypertension Dyslipidemia	Hypertension Dyslipidemia Peripheral vascular disease Polyneuropathy	Hypertension Dyslipidemia Adrenal adenoma right
Medication that may delay wound healing	Insulin	Linagliptin Amlodipine	Insulin
ADL	Care dependent	Care independent	Care dependent
Activity level*	Chairfast	Chairfast	Walks occasionally
Location of the wound	DFU Toe 1 right	DFU Toe 4 left	DFU Toe 5 left
Existence of the wound (weeks)	4	12	4
Severity of DFU°	Grade III	Grade II	Grade I
Treatment setting	At home	At hospital	Start at hospital (2 wks), then at home (2 wks)
Type of caregiver	Professional	Professional	Professional

***Braden scale** **°Wagner classification**

Table 1: Demographics of participants.

	Case 1	Case 2	Case 3
Treatment prior to application of the wound spray*			
Wound bed preparation	Surgical sharp debridement	Surgical sharp debridement post removal toe 5	Surgical sharp debridement
Cleansing	Normal Saline 0,9%	Normal Saline 0,9%	Normal Saline 0,9%
Primary dressing	None	Mepilex Ag°	None
Secondary dressing	None	None	None
Treatment with the wound spray *			
At start			
Wound Surface Area (cm^2)	4.5 cm^2	21 cm^2	1 cm^2
Primary dressing	Wound spray	Wound spray	Wound spray
Secondary dressing	Non-woven gauze	Non-woven gauze	Non-woven gauze

			
At stop application of the wound spray*			
Completely/ partially healed (in days)	Completely healed (42 days)	Partially healed (42 days)	Partially healed (21 days)
Wound Surface Area (cm^2)	0 cm^2	1.5 cm^2	0.25 cm^2
WSA decrease (%)	100%	93%	75%
	42 days	42 days	28 days
Application of WOUND (days)			

*The reported primary wound dressing is a spray based on St John's wort oil and Neem oil, currently available as WOUND. (https://www.bap-medical.com/brands/wound/).

°Antimicrobial foam bandage.

Table 2: Treatment with the wound spray.

	Case 1	**Case 2**	**Case 3**
Adverse events related to the wound spray *	None	None	None
Feasibility of applying the wound spray *	9	9	10
Appreciation of the wound spray * (bad-moderate-good-very good-excellent)			
Patients	Very good	Very good	Very good
Professionals	Excellent	Excellent	Very good

*The reported primary wound dressing is a spray based on St John's wort oil and Neem oil, currently available as WOUND. (https://www.bap-medical.com/brands/wound/)

Table 3: Adverse events, feasibility of applying the wound spray and appreciation of the wound spray.

Discussion

The wound spray in this case series study, consisting of a mixture of St John's wort oil and Neem oil, acts as a primary wound dressing for use in acute and chronic wounds [1, 9-16]. The oil layer on the wound surface reduces water evaporation from the wound, thereby creating a moist wound environment. In addition, it prevents adherence of a possibly used secondary dressing to the wound bed. Both effects are known to support wound healing [17].

The spray can be reapplied without removal of the previous application, which is an advantage over traditional dressings that always must be removed and replaced, with a risk of damaging the underlying recovering tissue and provocation of pain or infection upon removal [18].

In all 3 cases, application of the spray led to a decreased WSA and adequate induction of granulation tissue. These effects in total, may be explained by the antimicrobial activity of unsaturated fatty acids contained in the spray [2,3], the balanced moist environment obtained by the semi-occlusive layer the oil creates [14] and the fact that the oil prevents secondary dressings from adhering to the wound [18]. These effects are supported by data in the literature and may also imply a significant improvement of the quality of life of the affected patients.

In this small case series study, no adverse events were observed supporting the safety of this spray. The feasibility of application of the spray was rated as high by the caregivers and both patients and professionals, appreciated the wound spray between "*very good*" and "*excellent*".

All findings mentioned above are in line with literature about the treatment of DFU's with a wound spray [1,5,13-15,17].

Unsaturated fatty acids, particularly oleic and linoleic acid, in the wound spray contribute to epidermal regeneration by maintaining a moist wound environment that supports re-epithelialization. In addition, their incorporation into the epidermal lipid matrix strengthens barrier function, thereby reducing transepidermal water loss and creating favourable conditions for wound healing [19].

There are some limitations of this case series study and studies performed in the past.

The most important limitations are the small number of cases in most studies, including this one and the overall limitations associated with the case study design, which do not meet high standards of scientific evidence. Therefore, the results, despite pointing in the same direction and being uniformly positive as published in this and other articles, must be interpreted with caution [5].

Conclusion

Overall, the results of this short case series are in line with the existing literature indicating that the wound spray consisting of a mixture of St John's wort oil and Neem oil may be a promising non-touch treatment option in DFU patients. Larger and more rigid longitudinal studies, preferably with a randomized controlled design are needed to confirm the efficacy of this innovative product more definitely.

Acknowledgments

We thank all 3 patients for participating in this study voluntarily.

Ethical Considerations

The wound spray is a wound product that is regularly on the market. An informed consent procedure was followed during the inclusion of the 3 patients.

Conflict of interest

All authors declare no conflict of interest.

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