

The use of herbal medicine in diabetic foot complications: A case report from a Saudi Arabian Bedouin

Malone M & Al Gannass A

Abstract

The flora of plant life within Saudi Arabia has one of the richest biodiversity systems in the Arabian Peninsula and encompasses a mass of important medicinal herbs, shrubs and plants. According to Al-Yahya¹, the Arabian Peninsula is the birthplace of herbal drugs and the use of folk medicine still plays an important role within Saudi Arabian culture. Many patients in Saudi Arabia still seek out alternative forms of therapy such as the use of honey, black seeds, myrrh, fenugreek, kawajawa and other herbs, roots and shrubs, as this rich family tradition and culture is passed down from generation to generation. The use of such alternative forms of medicine, however, can often result in problems with compliance to the modern management of medical conditions such as diabetic foot ulceration, and can expose patients unwittingly to the hazards of traditional remedies and to the hazards of non-adherence to modern medical management.

Keywords: diabetic ulceration, Saudi Arabia, folk medicine, gangrene.

Key points

1. The use of folk medicine for treating diabetic ulceration is extremely common.
2. Effective education on diabetes is needed.

Case report

Mrs B, a 68-year-old Bedouin female from Saudi Arabia, presented into the podiatric surgical unit in Riyadh, with dry gangrene. Mrs B was illiterate and could not read and write, which is a common finding in the older Saudi population aged >65 (73.9% illiteracy rate)². Mrs B had never received any form of diabetes care education and the availability of specialist diabetes services were extremely limited due to her geographical location and the limited infrastructure of the Saudi Arabian health care system. Mrs B was accompanied to the hospital with her family following a nine-hour trip from the southern region of Saudi Arabia. More interestingly, Mrs B's family informed the podiatry team that they had been

using traditional medicine in the form of honey mixed with ground myrrh and black seeds over the past two months. Following a worsening of the gangrene, the patient decided to present herself for treatment.

The medical history of Mrs B revealed type two diabetes (1990), dyslipidaemia (2000), hypertension (2000), ischaemic heart disease (2005), post-coronary artery bypass grafting (2005) and peripheral vascular disease (2003). Current medication included insulin regular/NPH 16 units, Clopidogrel 75 mg, Concor 2 mg daily, Amlor 5 mg daily, Diovan 160 mg, Glucophage 500 mg, Fruesimide 40 mg. Presenting HbA1C was 13.

Clinical presentation

Upon presentation it was clear that on the left foot there was severe dry gangrene affecting all the digits with good demarcation evident and no clinical signs of infection (Figures 1 and 2). According to Mrs B's family, the onset of the gangrene had started initially in two toes and then spread proximally over a course of eight weeks.

Investigations

A full blood count (FBC) including erythrocyte sedimentation rate (ESR) was ordered. An ESR of 57 mm/hr was reported

Malone M MSc

Head of Podiatry, High Risk Foot Clinics,
Liverpool Hospital, Sydney, NSW, Australia

Al Gannass A DPM

Director of Podiatric Surgery, Department of
Surgery, National Guard Health Affairs, King
Abdulaziz Medical City, Riyadh, Saudi Arabia



Figure 1. Gangrene of the digits and extension onto the plantar surface.

(normal range 0–30 mm/hr), WBC $7.2 \times 10^3/\mu\text{L}$ (Normal range 4–11) and C-reactive protein $<3.5 \text{ mg/L}$ (Normal <3.5).

A consultation was arranged with the vascular team on the initial presentation day to save multiple journeys. The vascular team arranged a CT angiogram and vascular laboratory studies, which also took place on the initial visit. Both dorsalis pedis and posterior tibial pulses were absent and Doppler waveforms were weak and monophasic. An ABPI (Ankle Brachial Pressure Index) of 0.5 was obtained from both feet, but no toe pressures were undertaken as per the advanced gangrenous state of the toes. The CT angiogram confirmed chronic peripheral vascular disease but did suggest integrity of the popliteal and femoral arteries. Given the results, the vascular team suggested that a below knee amputation (BKA) was necessary.

Treatment

Following consultation with the patient and her family, they rejected the option of a BKA and so a joint decision was made to remove the gangrenous areas but ultimately try to save the residing foot. Following all consultations on the initial visit, the foot was dressed with a dry dressing (Inadine and

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Figure 2. Auto amputation with good demarcation at base of the phalanx's.

sterile gauze) and the patient was admitted as a day case for elective surgical removal of the effected area under a local ankle block.

The procedure undertaken in theatre was to remove the gangrenous tissue without undertaking any surgical incisions into the non-affected tissue such as performing a full transverse metatarsal amputation (Figure 3) and refraining from undertaking aggressive surgical debridement. The reasoning behind this less invasive option was to protect the patient against the complications commonly involved with poor peripheral arterial circulation. Post-amputation, the wound site was dressed with a primary dressing in the form of a hydrogel-based product and the secondary dressing was with a foam product.

Post three-day review by the out-patient podiatry team indicated a positive reduction in necrotic tissue and the majority of the wound was now sloughy. The chemical debridement plan using a hydrogel dressing (Figure 4) was continued.

At eight weeks, the slough had reduced substantially and the patient was followed up every other week in the podiatry clinic until week 16 where good granulation was noted (Figure 5).

Management:

The patient was referred back to a National Guard hospital nearer to her home to be monitored by the vascular service and to receive custom footwear and orthoses by the rehabilitation department. The patient and her family were provided with verbal education on diabetes and its complications numerous over the course of her visits as she could not read any information leaflets usually provided by the hospital. A major part of the management plan was also educating family members in order to empower them in the care of their mother, which was an important factor to take into consideration, given the family dynamics in Saudi Arabia.

Discussion

The patient in this case study presented with dry gangrene as a result of ischaemia caused by peripheral arterial disease (PAD). In one prospective cross-sectional study from Saudi Arabia of 471 diabetes patients, 11.7% had PAD with 92.7% of this sample remaining asymptomatic³.

Initially this patient's family recall seeing two toes which looked purple and mottled in colour and they put this down to a wound caused by her diabetes. In an attempt to self-treat the condition, the family began using herbal medicine and refrained from seeking medical advice.

In a cross-sectional study by Al Saedi⁴ of 1039 Saudi diabetic patients, the authors found that 30.1% of all patients had used traditional medicine to treat their diabetes and its associated complications. Similarly, in another study of 1634 diabetic patients with foot complications, the use of traditional medicine in diabetic foot complications was 21.7%. Interestingly, the most commonly used treatments



Figure 3. Removal of gangrenous forefoot.

were honey, with more than half of the diabetic patients (56.6%) with a history of foot ulcers indicating that they have used honey as a form of dressing protocol. In addition, a common combination that was often applied to the ulcer/s was honey and black seeds (19.1%), followed by honey and myrrh (12.1%)⁵. In this case study, Mrs B's family used a combination of myrrh (*Commiphora molmol*), pomegranate (*Punica granatum*) and black seeds (*Nigella sativa*), which were ground into a paste and added to honey.

Myrrh is the dried oleo-gum resin obtained from the stem of the plant *C. molmol* and is found in the arid and semi-arid regions in Arabia such as the Farasan Islands, a group of coral islands in the Red Sea located in Saudi Arabian territory (Figures 6 and 7). For many years, myrrh has been used for its healing qualities during injuries, as it is reported to have considerable anti-microbial and anti-inflammatory properties⁶. The benefits of using the oleo-gum resin in modern medicine have been explored by Tariq *et al.*⁷ and Al-Harbi *et al.*⁸ in their experiments on mice, of which *C. molmol* was found to have significant anti-inflammatory and anti-pyretic effects on wounds. Further to this, in a recent study by Haffor⁹, he conducted trials on mice to examine the



Figure 4. Post 3 day review. Note the sloughy tissue

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Figure 5. 16 weeks post removal. Good healthy granulation with minimal slough.

effects of *C. molmol* on leukocyte proliferation. The research design included making a superficial wound on the bottom of the mice's feet in the treatment group, then 500 mg of dried *C. molmol* resin was diluted with water and given to the mice to drink. Following this, the authors found that the mice who were given the *C. molmol* had significant proliferation in all types of leukocytes, neutrophils and monocytes and had significantly quicker healing rates than in those mice who were not given *C. molmol*. Unfortunately, no human trials have been conducted in this area.

Black seed (*N. sativa*) is an indigenous herbaceous plant found in the Mediterranean region (Figure 8) and its seeds have been used in traditional medicine for skin infections for centuries^{10,11}. The extract thymoquinone, which is obtained from crushing the seed, has many reported pharmacological properties such as anti-inflammatory¹², anti-diabetic¹³ and anti-tumour effects¹⁴.

In one study on the anti-microbial actions of black seed (*N. sativa*) the study found significant inhibition of *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and pathogenic yeast *Candida albicans*¹⁵. This finding was also shown in

another study on the use of the oil obtained from the black seed, which found significant anti-bacterial effects on gram-positive (*S. aureus*) and gram-negative (*E. coli*) bacteria¹⁶.

Current interest in the use of pomegranate (*P. granatum*) in wound repair focuses largely on pomegranate's antioxidant, anti-inflammatory and anti-microbial activities. However, in an interesting study by Aslam *et al.*¹⁷, they found that pomegranate peel extract stimulated type I procollagen synthesis and inhibited matrix metalloproteinase-1 (MMP-1; interstitial collagenase), which may prove useful in chronic wounds. The anti-bacterial and anti-fungal benefits of pomegranate have also recently been published in a study by Hanoui *et al.* (2011)¹⁸ on guinea pigs. The peel of pomegranate was used to make an extract-based ointment which exhibited significant anti-bacterial and anti-fungal activity against organisms which can be commonly found in diabetic foot ulcers such as; *P. aeruginosa*, *S. aureus*, *E. coli*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, and the fungi *C. albicans*. Unfortunately, to date there have been no clinical trials for the use of pomegranate in human wounds. The beneficial effects of honey in wound care have been extensively published in the literature and will not be discussed further in this case report¹⁹⁻²¹; however, the effects of other such medicinal herbs used in humans for wound care is still widely unknown.

With the exception to medicinal herbal usage in this case report, the other problems which were encountered in managing this case, which seem to be a common occurrence within the Kingdom of Saudi Arabia and also more specifically in the Bedouin population, were also:

- Poor patient education on diabetes and its complications.

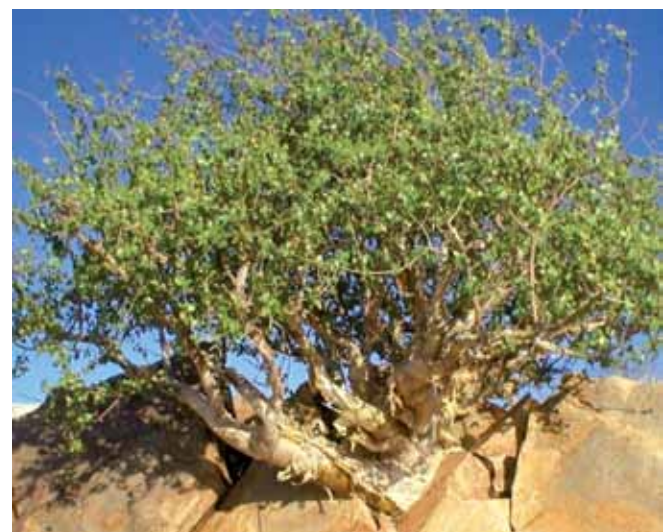


Figure 6. Myrrh Shrub

- A reluctance to seek medical advice and as such a longer duration before presentation.
- Poor patient compliance.
- High illiteracy rates.
- High usage of herbal/traditional medicine.
- Poor access to specialist diabetes services, that is, foot care services.

When the above factors are combined with the use of herbal medicine, the combination can be devastating to the lower limb, as shown in this case study. Furthermore, the use of herbal medicine in such a way is really administered in conjunction with a patient's phobia to surgery and/or seeking medical advice. This author and others²² have anecdotally witnessed that patients would rather use herbal medicine than seek treatment from a medical professional for wound care, for fear of losing their limb or the doctor suggesting amputation. Ironically, it is often the case that with the delayed presentation of these patients a simple foot ulcer or, in this case gangrene of the foot, turns into a limb-threatening scenario. In Mrs B's case, early presentation could have allowed for early vascular intervention and ultimately prevented the destruction seen to the toes, albeit treating the gangrene in this case was only part of the treatment plan. A large proportion of time management in this case study was dedicated to improving not only the patient's knowledge on diabetes and its associated complications, but also to increasing the family's knowledge.

Finally, the health care structure of Saudi Arabia was only established in the 1950s with the development of the Ministry



Figure 7. Myrrh resin

of Health; however, the real drive in developing the system and healthcare services was only started in the 1970s^{23,24}. Although the country is undergoing a massive health care boom, the delivery of diabetes services, provisions for specialist services such as foot care services and the training of Saudi nationals in this field, is yet to catch up from that around the globe, leaving patients such as Mrs B travelling long distances to reach these services, if patients are willing or have the means to travel at all.

Conclusion

Throughout history the use of traditional medicines and herbs have been widely reported in the use of wound care. The tradition of using herbal medicine is often passed down from generation to generation and its roots for Saudi Bedouins can be traced back to their nomadic desert dwelling era, where

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Figure 8. *Nigella Sativa* plant

the need to know about the environment was a necessity to ensure survival. This need to know the environment is also the common dominator across other indigenous populations such as those found in Australia. Therefore, the intention to use herbal medicine in these populations may differ from other groups, in that the decisions are not based on the most up-to-date medical knowledge, but based on traditional values that have been instilled from one generation to another. This is why culturally appropriate services may prevent these types of presentation seen in this case study, as the respect for traditional values are combined in an appropriate way with the need to educate patients on 21st century medicine by people who have experience in this area.

Looking at the types of herbs and remedies used by the patient in this case study and the chemical composition of them; it is easy to understand how and why these herbs may have first been used many years ago, as the herbs possess anti-microbial, anti-inflammatory and anti-pyritic properties. There is, however, a large gap that needs to be bridged in educating patients and their families on diabetes and diabetic foot complications so that future limbs are saved. This education needs to be provided in culturally appropriate settings where practitioners are able to appreciate the rich traditional values of the Bedouin and other indigenous populations, whilst aiming to educate and empower their patients regarding their disease and its management.

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