

CASE REPORT

Improvised Hand Injury Treatment Using Traditional Veterinary Medicine in Ethiopia

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In remote wilderness environments, local people with traditional knowledge of medicinal plants are potentially important first-line health care providers. We present a case of a 31-year-old man who fell off a horse while trekking through a remote mountain landscape in Ethiopia and sustained blunt force trauma to the hand. A local mountain hut keeper examined the patient's hand and used heated leaves of the succulent plant *Kalanchoe petitiiana* to treat a suspected metacarpal fracture. As first responder in a low-resource setting, the hut keeper relied on his traditional knowledge of ethnoveterinary medicine to improvise a treatment for a human injury in a remote mountain environment. Although in this case the outcome of the traditional intervention was positive, our analysis shows that the massage component of the intervention could have led to complications. Conversely, reports from the use of related *Kalanchoe* species suggest that heated *Kalanchoe* leaves could be useful in the compression component of traditional care for hand injuries. Validation of traditional remedies and their therapeutic potential are needed if they are to complement wilderness wound care safely and reliably. The documentation and validation of these remedies are urgently needed, as many medicinal plants and indigenous knowledge of how to use these valuable natural resources are being lost.

Keywords: *Kalanchoe petitiiana*, metacarpal trauma, mounted horse accident, wilderness wound care

Introduction

Adventure travel and ecotourism have been marketed as sustainable forms of tourism that support environmental conservation.¹ To ensure a sense of exclusivity, the adventure travel sector is increasingly engaged in physical activities such as hiking and camping in remote wilderness environments^{2,3} despite the increased chance of injuries.⁴ In the event of injuries in low-resource settings far from medical infrastructure and care, local people with traditional knowledge of medicinal plants are potentially important first-line health care providers because they often primarily rely on medicinal plants and traditional knowledge to treat human and livestock ailments.⁵ We present a case of the improvised treatment of a horseback riding injury using

ethnoveterinary medicine in the Bale Mountains in Ethiopia.

Ethiopia is characterized by a diverse landscape of contrasting ecoregions, ranging from hot arid lowland deserts to cool mountain landscapes with Afroalpine vegetation.⁶ These ecoregions have a high biotic diversity, both in terms of species richness and turnover, and are home to a large number of ethnic groups. These people typically use a specific suite of medicinal plants sourced from their environment to treat human and livestock ailments.^{7–15} Upon review of the literature, we found 43 studies that documented Ethiopian traditional medicinal plants, 18 of which also reported the ailments for which the plants were used (average number of informants per study [mean±SE], 143±32; 42 studies; total number of informants across studies, 6011). On average, local communities throughout Ethiopia reported the use of 80±8 medicinal plants (43 studies) for 51±7 human and livestock ailments (18 studies) (see online [Supplemental Material](#) for data and location of studies). Gastrointestinal disorders, parasites, and external injuries as well as mental

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disorders and spiritual conditions are frequently treated using medicinal plants.

Here, we specifically address the application of an ethnoveterinary practice in the improvised treatment of a human injury in a remote mountain environment. This case report describes the use of heated fresh leaves of *Kalanchoe petitiiana* A. Rich to treat blunt hand trauma sustained after a fall off a horse (Figure 1). This succulent plant is native to the highlands of Ethiopia (Figure 2), and its fresh leaves are reportedly used as dermal medicine. Heated leaves of *K. petitiiana* are used as human medicine to relax sore muscles and as veterinary medicine to treat swelling and broken bones in cattle.^{14,15} The anti-inflammatory, antimicrobial, and wound healing properties of *K. petitiiana* have been demonstrated in vitro and in animal models,^{16,17} but detailed case reports on its use in human medicine are lacking.

Case presentation

In November 2006, an otherwise healthy 31-year-old man experienced blunt traumatic injury to the hand when falling off a horse in the Bale Mountains in Ethiopia. The Bale Mountains are a unique and remote alpine wilderness area southeast of the Rift Valley in Ethiopia, characterized by a wide variety of habitats that include Afroalpine moorlands, lava fields, moist tropical forest, and cloud forest, spread over a number of plateaus incised by wide valleys and separated from each other by steep escarpments and ridges. Horseback riding through remote mountain areas can be a rewarding outdoor experience, but the intrinsic steepness and roughness of mountainous terrain exacerbate the risks of injuries, which include extremity fractures as well as head and spinal injuries due to falling or being thrown while riding.^{18–20}

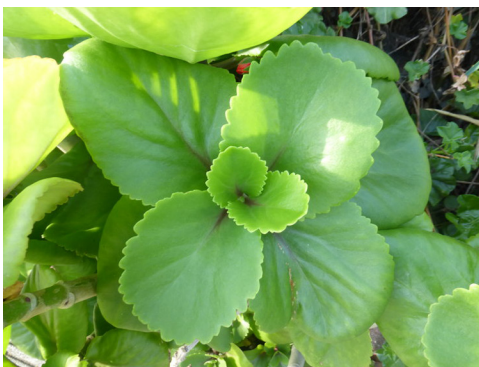


Figure 1. Leaves of *Kalanchoe petitiiana*. Image by Zoya Akulova, 2015, and reproduced under Creative Commons license (CC BY-NC 3.0), with written permission.

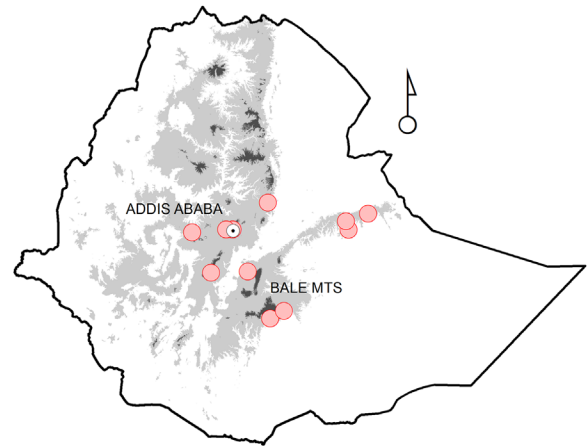


Figure 2. Occurrences of *Kalanchoe petitiiana* in Ethiopia registered in the Global Biodiversity Information Facility with an indication of the Ethiopian highlands (mountainous areas with an altitude >1800 m shaded in gray). Occurrence data downloaded from GBIF.org on February 10, 2017, doi:10.15468/dl.bd5zlm. Elevation data and boundary data from EthioGIS, Geospatial Information System Ethiopia, Centre for Development and Environment, University of Bern Switzerland (1999).

While mounted and negotiating gullied terrain through degraded juniper-heath forest en route to Wahoro camp in the Adaba-Dodola protected forest (6°51'11"N, 39°10'54"E, 3271 m above sea level), the patient's horse tripped on a rock, spooked, and bolted under a tree trunk that had fallen over a deep gully. This caused the patient, who was wearing a 10 kg backpack, to fall. A dive roll absorbed most of the impact of the fall, but the patient sustained substantial blunt force trauma to the back of the right hand by hitting it on a rock when exiting the roll. The patient reported intense pain over the metacarpal bones, pain on flexion of the fingers, and a strong reduction of functional capacity such as gripping. There was local swelling to the back of the hand, although the skin was intact. There was no obvious deformity of the hand. There were no injuries to head and neck, face, chest, or abdomen. Apart from the hand injury, there were only minor external bruises.

Under normal circumstances, clinical and radiologic examination of the hand would have been needed to properly diagnose the injury,²¹ and first aid would have consisted of rest, ice, compression, and elevation (RICE) therapy. Instead, the hand was splinted using a fleece tubular scarf. Upon reaching the Wahoro mountain hut for the overnight stop, the hut keeper—a local farmer—examined the hand and suspected a metacarpal fracture, which he offered to treat using a medicinal plant he claimed to use to treat injuries in horse legs.

Fresh leaves of the succulent plant *Kalanchoe petitiiana* (Crassulaceae; Oromo vernacular name An'chural/

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