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# An ethnobotanical survey of traditional medicinal plants used against lymphatic filariasis in South Africa

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ABSTRACT

Lymphatic filariasis is a condition where the skin thickens and hardens after excessive swelling associated with lymphoedema. The condition is caused by infection with parasites classified as nematodes. In this study, an ethnobotanical survey of medicinal plants used against lymphatic filariasis in the Eastern Cape, Free State, KwaZulu-Natal and Mpumalanga Provinces of South Africa was conducted through the use of structured questionnaires. Information was gathered from 21 traditional healers, 9 herbalists and 12 elderly people. The respondents were asked questions regarding their use of medicinal plants to treat lymphatic filariasis and related ailments. Information entailing plants used to treat lymphatic filariasis, plant parts used, mode of preparation and dosage was recorded. The information collected revealed 46 medicinal plants belonging to 28 families were used against lymphatic filariasis. Members of the Asteraceae family were the most prominent, followed by Hyacinthaceae, Euphorbiaceae and Solanaceae. It was interesting to note that different traditional healers from the four Provinces use similar plants to treat lymphatic filariasis. The most frequently mentioned plants were *Elephantorrhiza elephantina*, *Eucomis autumnalis*, *Ganoderma* sp., *Solanum aculeastrum*, *Hermannia geniculata*, *Datura stramonium* and *Pentanisia prunelloides*. Leaves and underground plant parts were reported to be the most commonly used plant parts. The most prominent methods of herbal administration used were orally and soaking of the affected body part. This study has documented important ethnobotanical information on medicinal plants used by South African healers and indigenous people in the treatment of lymphatic filariasis and related diseases.



## 1. Introduction

Lymphatic filariasis (LF), commonly known as elephantiasis, is a sign of a variation of illnesses where parts of a person's body swell to enormous proportions. LF is characterized by thickening and hardening of the skin and subcutaneous tissue that results in grossly enlarged and very swollen limbs due to lymph accumulation (lymphoedema) (Mandal, 2014). The disease is mostly noticeable in the lower limbs, but also commonly affects breasts, arms and the scrotum in males. This is one of the most painful and intensely disfiguring diseases. LF is caused by infection with round filarial parasites classified as nematodes. The three types of filarial worms are *Wuchereria bancrofti* (which is responsible for 90% of the cases), *Brugia malayi* and *Brugia timori* (WHO, 2016).

According to WHO (2014), more than 1.4 billion people in 73 countries are living in areas where LF is transmitted and are at risk of being infected. Currently, over 120 million people are affected by the infection, with 40 million people showing chronic disease symptoms (Molyneux, 2003; WHO, 2009; Maurya et al., 2015). One third of the people infected with LF live in India, one third in Africa and the remainder in South-East Asia, the Pacific, New Guinea and the Americas (Wynd et al., 2007). Within the African region, LF is endemic in 39 countries and the population at risk is estimated at 390 million (Zagaria and Savioli, 2002; Simonsen et al., 2008).

South Africa is also burdened by LF, and according to a report by eNCA (2013), treating the disease remains a problem in South Africa. The unavailability of statistical data on LF adds to the problem. Approximately 31% of the South African population are at risk of being infected with bancroftian filariasis (Berger, 2014), with 530,000–1.06 million people having some form of lymphoedema (Davey, 2014). In a report published by Dlamini (2011) and eNCA (2013), patients are often turned away from some of the public hospitals in South Africa, reasons being that there is no treatment in the country or that the disease needs specialist care. People who are affected by this disease suffer from disability, as well as social and financial losses contributing to

*Abbreviations:* DEC, diethylcarbamazine; LF, lymphatic filariasis; WHO, World Health Organization.

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stigma and poverty (Evans et al., 1993, Ramaiah and Ottesen, 2014, Maurya et al., 2015).

Prevention of LF is possible by stopping the spread of the infection (WHO, 2014). Its treatment involves a dose of albendazole together with ivermectin or diethylcarbamazine (DEC). Antibiotics may also be used to treat bacterial cellulitis which arises secondary to massive lymphoedema and elephantiasis. Unfortunately, these drugs are ineffective against adult worms, which are the ones that cause the disease (Debrah et al., 2007; Maurya et al., 2015). In addition, Netcare Foundation is providing funds for the treatment of elephantiasis, however, due to the lengthy process, the selection criteria for being accepted onto the programme are strict, resulting in a small number of patients being eligible (Netcare Limited, 2013). Hence, there is a need for an alternative treatment that is cheaper and as effective as allopathic management of the disease.

Treating elephantiasis using medicinal plants is a common practice in some parts of the world. There are several herbs that have been prescribed by Ayurvedic medicine, for example, to treat elephantiasis, and some of them have been used for centuries (Agrawal, 1997; Gupta and Tandon, 2004). This study was aimed at gathering information from herbalists and traditional healers on traditional medicinal plants used to treat LF from four provinces in South Africa.

## 2. Materials and methods

### 2.1. Study area

Ethnobotanical surveys were conducted from the Eastern Cape (Intsika Yethu and Nkonkobe Municipal areas), Free State (Dihlabeng, Maluti-a-Phofung and Nketoana municipal areas), KwaZulu-Natal (Abaqulusi and eThekwini municipal areas) and Mpumalanga (Nkomazi municipal area) Provinces of South Africa.

The Free State is an inland bean-shaped Province of South Africa. It is the third largest Province; covering about 10.6% of the country's total area and provides for most of the commercial farming of South Africa (SouthAfrica.info, 2015). Four biomes found within the Province are grassland, Nama Karoo, savannah and forest; with 37 vegetation units found within these biomes (Mucina and Rutherford, 2006). The eastern part of the Free State consists of cool to very cold winters, especially towards the mountainous regions, and warm to hot rainy summer days.

The Eastern Cape is a second largest Province, covering about 13.8% of the county's total area (South African Government, 2014). Maputaland-Pondoland Albany, the second biodiversity hotspot of South Africa is found in this Province. It is dominated by closed shrublands, low forests with evergreens, succulent trees, vines and shrubs (Hamann and Tuinder, 2012). It is characterized by the southern Drakensberg Mountains, ragged cliffs, northern tropical forest and dense bushes. Indigenous forest plants include yellowwoods, white stinkwood and many exotic plants (Hamann and Tuinder, 2012). The Eastern Cape displays a rainfall pattern with two modes, a winter rainfall zone in the west, and a summer rainfall zone in the east (Hamann and Tuinder, 2012).

KwaZulu-Natal consists of three distinct geographical areas, the lowland Indian Ocean coastal region, the central Natal Midlands and the mountainous areas of the Drakensberg and Lebombo Mountains. Savannah grassland and areas of indigenous forest are found between the mountains and the humid, subtropical coastline (SouthAfrica.info, 2015). The area is characterized by a fragmented distribution of medicinal plant species due to the varied land use, topography and climate (Mander, 1998). Kwazulu-Natal is a summer rainfall area, with extremely hot temperatures in summer and heavy snow on the mountains in winter (SouthAfrica.info, 2015).

Mpumalanga is a Province where the climate varies due to its topography. The Mpumalanga climate changes from the highveld to the lowveld area, and the vegetation in each area is determined by the climate it experiences. The lowveld has a tropical climate, with warm sub-tropical temperatures and experiences high summer rainfalls. This area receives mean rainfall of 620 mm between September and March per annum, and due to the moist climate, the lowveld is a perfect home for mosquitoes to thrive in (SouthAfrica.info, 2015).

### 2.2. Data collection

Data was collected between February 2015 and October 2016. Information was compiled through general conversations with the informants while structured questionnaires were used to obtain additional information about the methods of treatment (Jovel et al., 1996). The main aim and vision of the interviews were explained to the participants and they consented to share their knowledge with us. Their consent to publish the findings was obtained before questioning. The information that was recorded included the age group and gender of the persons interviewed, common names of the plants used, their local uses, parts of the plants used, the mode of preparation and forms of administration of the medicinal plants. Ethical clearance was obtained from the University of the Free State.

Plants were collected with the assistance of the traditional healers and herbalists. They were initially identified by their common names and proper identification was done by Dr. E.J.J. Sieben and voucher specimens were prepared and deposited at the herbarium of the University of the Free State (QwaQwa Campus).

## 3. Results and discussion

The ethnobotanical list with detailed information is presented in Table 1. Information was gathered from 21 traditional healers (12 females and 9 males), 9 herbalists (all males) and 12 elderly people (4 females and 8 males). The ages of the informants ranged from 28 to 80 years old. During the ethnobotanical survey, it was established that all the informants frequently used medicinal plants to treat LF and the related diseases. It was interesting to note that traditional healers/herbalists from the different Provinces use the same plants, but had varying common names, to treat LF. For example, *Elephantorrhiza elephantina* was used by traditional healers from the Eastern Cape, Free State and KwaZulu-Natal to treat LF. In the Eastern Cape and KwaZulu-Natal the plant is known by *Intolwane*, whereas in the Free State it is known by *Mositsane*. All the informants mentioned that they collect plants from the veld. They only cultivate those that are difficult to access.

The study revealed that 46 medicinal plants belonging to 28 families were used to treat LF and related ailments in South Africa. Members of the Asteraceae family were the most prominent with 7 species, followed by Hyacinthaceae with 6 species, Euphorbiaceae with 4 species and Solanaceae with 3 species. The rest of the families were represented by either one or two species each. Seven plants were frequently mentioned for the treatment of LF and related ailments by the traditional healers and herbalists from the Eastern Cape, Free State and KwaZulu-Natal Provinces. These included *E. elephantina*, *Eucomis autumnalis*, *Ganoderma* sp., *Solanum aculeastrum*, *Hermannia geniculata*, *Datura stramonium* and *Pentanisia prunelloides*. *Dicoma anomala*, *E. elephantina*, and *P. prunelloides* have been reported to treat and manage a wide range of ailments in Lesotho and are, thus, in high demand (Kose et al., 2015). Plants could be used individually or in combination to treat LF. For example, one of the traditional healers from the Eastern Cape treated LF by using a mixture that contained equal portions of *Eucomis comosa*, *Euphorbia clavarioides* and *Rumex obtusifolius*.

*Ricinus communis*, *Drimia depressa*, *D. stramonium*, *S. aculeastrum*, *E. autumnalis*, and *Withania somnifera* have been reported to possess toxic compounds though they are used for medicinal purposes (Taylor and Van Staden, 2001; Van Wyk et al., 2002; Ndhlala et al., 2013; Kose et al., 2015). These plants should, therefore, be handled with care and not be used without proper supervision.