

Full Length Research Paper

Bapedi phytomedicine and their use in the treatment of sexually transmitted infections in Limpopo Province, South Africa

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Thirty four traditional healers from 17 municipalities, covering three districts of the Limpopo Province, were interviewed during the first half of 2011. Fourty seven plant species belonging to 32 families, mostly from the Asteraceae (9%), Asphodelaceae, Fabaceae and Hyacinthaceae (6% for each) were used to treat sexually transmitted infections (STIs) such as gonorrhoea, HIV/AIDS, nta (unspecified venereal disease - Bapedi terminology) and syphilis. Eighty seven percent of the species were used to treat a single STI, with the remainder being used to treat two STIs. Double-used species include: *Aloe marlothii* (gonorrhoea and chlamydia), *Callilepis salicifolia* (gonorrhoea and HIV/AIDS), *Cucumis myriocarpus* (gonorrhoea and syphilis), *Drimia elata* (gonorrhoea and HIV/AIDS), *Hypoxis hemerocallidea* (gonorrhoea and HIV/AIDS) and *Ziziphus mucronata* (gonorrhoea and nta). Diagnosis of STIs by Bapedi traditional healers is based primarily on the presentation of symptoms and certain behavioural traits, which are not always accurate indicators. The present study concludes that Bapedi traditional healers' knowledge can lead to useful medicinal plants to manage and treat STIs. Furthermore, given the necessary health information and support, these healers could play an important role in the management and treatment of STIs in the Limpopo Province.

Key words: Traditional healers, ethnobotany, medicinal plants, sexually transmitted infections

INTRODUCTION

Sexually transmitted infections (STIs) are a major public health concern in developing countries. According to World Health Organization (1991), *Treponema pallidum*, *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and *Trichomonas vaginalis* are the parasitic pathogens responsible for most STIs. These infections respond well to treatment with antibiotics. However, globally, there are over 25 STIs, some of which have serious and permanent health problems when left untreated, while many facilitate the spread of HIV/AIDS infections

(Paavonen, 2004).

In southern Africa, transmission rates are reaching epidemic proportions where STIs are currently one of the highest in the world (Van Vuuren and Naidoo, 2010). In South Africa, 26% of all deaths during the year 2000 were as a result of STIs (Johnson et al., 2000). Sexually transmitted infections are one of the most common reasons for people to visit traditional healers in South Africa. According to Msiska et al. (1997) rural patients are more dependent on traditional medicine from healers for STIs because of hesitancy to relate this form of illness to unknown doctors and being examined by a member of the opposite sex in western treatments. A survey by Peltzer (2003) found that among rural adult South

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Africans who had STIs in the past 12 months, 36% did consult a traditional healer for treatment.

These healers do not have access to laboratory services and rely on the presence of symptoms and certain behavioural traits to assist them in their diagnosis of STIs (Kambizi and Afolayan, 2001). In cases of symptomatic presentation the occurrence of one or more of the following forms part of the WHO syndromic management guidelines: Abnormal urethral discharge, dysuria or ulcers in the genital area (Johnson et al., 2011). These guidelines aim to treat STI patients according to their symptoms, are in line with the approach followed by traditional healers.

Traditional healers use medicinal plants as their primary source of medicine to treat STIs. Significant literature exists in support of herbal remedies being used to treat STIs by traditional healers of different cultures in Africa (Ndubani and Hojer, 1999; Kambizi and Afolayan, 2001; Chigora et al., 2007; Ssegawa and Kasenene, 2007; Kamatenesi-Mugisha et al., 2008; Kayode and Kayode, 2008; Njoroge and Bussmann, 2009; Hossan et al., 2010; Chinsembu and Hedimbi, 2010; Namukobe et al., 2011; Maroyi, 2011; Muthee et al., 2011). South Africa is no exception and studies such as Samie et al. (2005); Tshikalange et al. (2005); Amusan et al. (2005); Mulaudzi et al. (2011); De Wet et al. (2012) highlight this. The extensive documentation of the plant use by a significant number of cultures around the world has led to extensive knowledge of the used plants' chemistry and pharmacological effects (Alam et al., 2012; Asgarpanah and Ramezanloo, 2012; Nasri et al., 2012). It is thus unfortunate that one of the great ethnic groups in South Africa, the Bapedi, has received no attention regarding their *materia medica* for STIs. The aim of this study was to document medicinal plants used by Bapedi traditional healers to treat STIs in the Limpopo Province, South Africa.

MATERIALS AND METHODS

The study area and population

The present study was carried out in 17 local municipalities (Table 1) of the Limpopo Province, covering the three of the five districts (Capricorn, Sekhukhune and Waterberg) that constitute the Limpopo province (Figure 1). The vegetation in these districts was classified by Acocks (1988) as arid-semi savannas. It is characterized by a mixture of trees, shrubs and grasses (Mucina and Rutherford, 2006). This type of vegetation has provided a diverse flora with rich medicinal plants that the people of the study areas have always used to treat many illnesses.

The surveyed districts are inhabited by Black people mostly from the Bapedi, Vhavenda and VhaTsonga ethnic groups, as well as coloured (mixed-race group) and white people. The Bapedi ethnic group constitutes the largest cultural group in the Limpopo Province (South Africa), comprising 57% of the total provincial population (Limpopo Provincial Government, 2012). This ethnic group use herbal medications either alone or in combination with orthodox medicines for the treatment of several diseases (Semenya et al., 2012). Majority of the Bapedi people in the studied districts are rural

dwellers, hence the use of plants for the treatment of common diseases, such as STIs which is very prevalent.

Ethnobotanical survey

A reconnaissance survey was done in each local municipality to: (i) obtain permission to conduct this study within their area of jurisdiction, and (ii) to meet with the traditional healers to request them to participate in the study. Information was collected from January 2011 to July 2011. Semi-structured interviewees, observation and guided field walks with traditional healers were employed to obtain ethnobotanical data.

Semi-structured questionnaires were completed by 34 traditional healers from 17 local municipalities. In each local municipality two traditional healers were randomly selected and the objective of the study was explained in Sepedi, the local language. Interviews were designed to gather data on the plants used to treat STIs, methods of preparation, administration of medicine and diagnoses of STIs. Field observations were made on the morphological features and habitats of each medicinal plant species in the field. Based on ethnobotanical information provided by traditional healers, specimens were collected, numbered, pressed and dried for identification at the University of Limpopo's Larry Leach Herbarium.

Data analysis

The recorded data were organised and analysed for descriptive statistical patterns with Microsoft Excel spreadsheet software. Descriptive statistics, such as percentages and frequencies, have been used to analyse the data obtained from the questionnaires.

RESULTS

Sexually transmitted infection identification

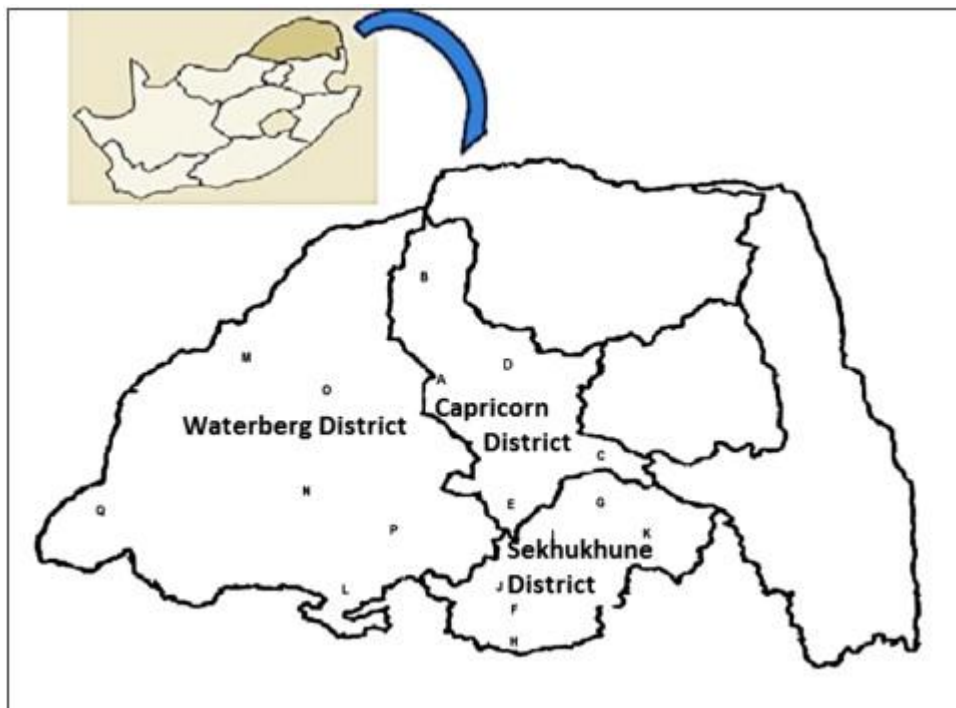
Five seemingly different STIs are treated by Bapedi traditional healers. These include gonorrhoea, chlamydia, HIV/AIDS, *nta* and syphilis. Not all of these STIs are treated by all the healers. In fact none of the traditional healers from a single municipality indicated that they treat all five-listed STIs. For example, two traditional healers from the Elias Motsoaledi municipality treat four of the five STIs, the exclusion being syphilis. Traditional healers from the Capricorn district treated only gonorrhoea and chlamydia; whilst those from the Sekhukhune district treat all the infections among them, and in the Waterberg district the focus was on chlamydia, gonorrhoea and HIV/AIDS.

Among the three districts general consensus regarding the presentation and identification of gonorrhoea was reached. All traditional healers agreed that behaviour such as unprotected sexual intercourse with many partners or an infected partner will result in being infected. The only symptomatic presentation used during the diagnosis was the presence of a smelly urethral discharge.

None of the healers from the Capricorn district treated HIV/AIDS. Therefore information regarding this disease was obtained only from Sekhukhune and Waterberg districts. Only one traditional healer (Modimolle municipa-

Table 1. Districts and local municipalities included in this study.

Capricorn district		Sekhukhune district		Waterberg district	
Aganang	A	Elias Motsoaledi	F	Bela-Bela	L
Blouberg	B	Fetakgomo	G	Lephalale	M
Lepelle-Nkumpi	C	Groblersdal	H	Modimolle	N
Molemole	D	Makhuduthamaga	I	Mogalakwena	O
Polokwane	E	Marble Hall	J	Mookgophong	P
		Tubatse	K	Thabazimbi	Q

**Figure 1.** Study area: Capricorn, Waterberg and Sekhukhune districts, Limpopo Province, South Africa. A to Q designates the involved municipalities.

lity) indicated exposure to contaminated blood as a source of infection. The remainder identified sexual intercourse with the partner of a person who died from HIV/AIDS as the leading cause of contracting this disease. Overwhelming support was observed for the occurrence of sudden and dramatic weight loss, which was, according to the healers, positively associated with HIV/AIDS.

Chlamydia was only treated by traditional healers from five local municipalities (Blouberg, Lepelle-Nkumpi, Polokwane, Elias Motsoaledi and Lephalale). General agreement has it that sexual intercourse with either a menstruating woman or a woman pregnant with another man's child will result in contracting this disease. These patients have an abnormal gait and an inability to urinate.

Information regarding the identification of *nta* is lacking as only one traditional healer from the Elias Motsoaledi municipality treats it. Unprotected sexual intercourse with

many partners was given as the reason for infection. A similar situation occurred regarding syphilis. Only one traditional healer from the Groblersdal municipality treats this disease. Once again unprotected sexual intercourse with many partners was a key factor in identification of the disease. However, this behavioural trait was complemented by the presence of a measles-like rash on the genitals.

Plants used to treat sexually transmitted infections

Bapedi traditional healers used 47 species of plants to treat chlamydia, gonorrhoea, HIV/AIDS, *nta* and syphilis (Table 2). These species belong to 43 genera and 32 families. The most representative families were Asteraceae (9%) followed by the Asphodelaceae, Fabaceae and Hyacinthaceae (6% each).

Table 2. Species and parts: Extract preparation, administration and dosages used by Bapedi traditional healers to treat sexually transmitted infections.

Species name	Voucher numbers	Botanical Family	Vernacular name	Used part/s	Preparation, dosage and administration	STIs treated	Citation No. (%)
<i>Aloe arborescens</i> Mill.	SS 59	Asphodelaceae	Kgopha-ya-fase	Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Aloe falcata</i> Baker	SS 330	Asphodelaceae	Kgopha	Root	Mixed with <i>E. crispa</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
				Root	Boiled singly for 20 minutes or mixed with <i>D. sylvatica</i> (bulb) and boiled for 20 minutes. One tin cup of either extract taken orally. Thrice a day	Gonorrhoea	
<i>Aloe marlothii</i> A. Berger subsp. <i>marlothii</i>	SS 80	Asphodelaceae	Kgopha-ya-go-ema	Root & leaf	Mixed and boiled for 15 minutes. One tin cup of the extract taken orally. Thrice a day		24%
				Leaf	Boiled for 10 minutes and one tin cup of warm extract is administered by healer (via a bulb syringe). Once a day	Chlamydia	
<i>Alternanthera pungens</i> Kunth	SS 402	Amaranthaceae	Mosweetswe	Tuber	Macerated in cow's milk for 24 hours and one tin cup of the decoction taken orally. Thrice a day	Gonorrhoea	3%
<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	SS 300	Capparaceae	Mohlophi	Root	Mixed with <i>E. elephantina</i> (root), <i>P. ciliatus</i> (root) and <i>P. africanum</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Burkea africana</i> Hook.	SS 60	Leguminosae	Monatlo	Root	Mixed with <i>C. verum</i> (root), <i>H. hemerocallidea</i> (tuber) and <i>G. aspera</i> (entire plant). Boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Caesalpinia decapetala</i> (Roth) Alston.	SS 74	Fabaceae	Mokgabane	Root	Boiled for 10 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	3%
<i>Callilepis salicifolia</i> Oliv.	SS 62	Asteraceae	Phelana	Tuber	Boiled for 5 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	6%
				Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	
<i>Carica papaya</i> L.	SS 70	Caricaceae	Mophopho "wapoo"	Root	Mixed with <i>C. myriocarpus</i> (tuber) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Gonorrhoea	3%
<i>Catharanthus roseus</i> (L.) G. Don	SS 33	Apocynaceae	Lepolomo-le-le-pinki-la <i>drop</i>	Root	Boiled for 5-20 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	82%
<i>Cinnamomum verum</i> J. Presl	SS 337	Lauraceae	Mokwere-kwere-o-mogolo	Root	Mixed with <i>B. africana</i> (root), <i>H. hemerocallidea</i> (tuber) and <i>G. aspera</i> (entire plant). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	SS 09	Cucurbitaceae	Morotse	Root	Mixed with <i>D. viscosa</i> (root) and <i>E. crispa</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Cotyledon orbiculata</i> L.	SS 37	Grassulaceae	Tsebe ya kolobe	Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day.	Gonorrhoea	3%
					Macerated in warm water for 24 hours. One tin cup of decoction taken orally. Thrice a day		
<i>Cucumis myriocarpus</i> subsp. <i>leptodermis</i>	SS 35	Cucurbitaceae	Magapyana	Tuber	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	Syphilis	6%
					Mixed with <i>C. papaya</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Gonorrhoea	
<i>Dioscorea sylvatica</i> var. <i>brevipes</i> .	SS 11	Dioscoreaceae	Monamela	Bulb	Mixed with <i>A. marlothii</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Gonorrhoea	3%
<i>Dodonaea viscosa</i> var. <i>angustifolia</i>	SS 117	Sapindaceae	Mofenshe	Root	Mixed with <i>C. lanatus</i> (root), and <i>E. crispa</i> (root). Boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
					Boiled for 10 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	
<i>Drimia elata</i> Jacq.	SS 18	Hyacinthaceae	Sekanama	Bulb	Mixed with <i>E. transvaalense</i> , <i>E. elephantina</i> (root), <i>S. birrea</i> (bark), <i>Z. capense</i> (root) and <i>S. viminale</i> (twigs). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	6%
<i>Elaeodendron transvaalense</i> (Burt Davy) Rott. Archer	SS 32	Celastraceae	Monamane	Root	Mixed with <i>D. elata</i> (bulb), <i>E. elephantina</i> (root), <i>S. birrea</i> (bark), <i>Z. capense</i> (root) and <i>S. viminale</i> (twigs). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%

Table 2. Contd.

<i>Elephantorrhiza elephantina</i> (Burch.) Skeels	SS 100	Leguminosae	Mosehlana/ moshisane	Root	Mixed with <i>P. africanum</i> (bark) and boiled for 20 minutes One tin cup of the extract taken orally. Thrice a day Mixed with <i>D. elata</i> (bulb), <i>S. birrea</i> (bark), <i>E. transvaalense</i> (root), <i>Z. capense</i> (root) and <i>S. viminale</i> (twigs). Boiled for 20 minutes One tin cup of the extract taken orally. Thrice a day Mixed with <i>B. albitrunca</i> (root), <i>P. ciliatus</i> (root) and <i>P. africanum</i> (root). Boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day.	HIV/AIDS	9%
<i>Euclea crispa</i> subsp. <i>crispa</i>	SS 57	Ebenaceae	Mokwerekwere	Root	Mixed with <i>A. falcata</i> (root) and boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day Mixed with <i>C. lanatus</i> (root) and <i>D. viscosa</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	6%
<i>Eucomis pallidiflora</i> subsp. <i>pole-evansii</i>	SS 355	Hyacinthaceae	Mathuba-difala	Entire plant	Mixed with <i>Z. mucronata</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	Chlamydia	3%
<i>Euphorbia maleolens</i> E. Phillips	SS 34	Euphorbiaceae	Rofa-bja-Tau	Entire plant	Mixed with <i>Triumfetta</i> spp. (root) and <i>Z. humile</i> (root). Pounded and five teaspoons taken orally with soft porridge. Thrice a day Mixed with <i>M. flabellifolius</i> (entire plant) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	HIV/AIDS	12%
<i>Geigeria aspera</i> Harv. var. <i>aspera</i>	SS 310	Asteraceae	Makgonatsohle	Entire plant	Mixed with <i>B. africana</i> (root), <i>C. verum</i> (root), <i>H. hemerocallidea</i> (tuber) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Gethyllis namaquensis</i> (Schonland) Oberm.	SS 83	Amaryllidaceae	Naka tsa tholo	Bulb	Macerate in warm water for 24 hours. One tin cup of the extract taken orally. Thrice a day	Chlamydia	3%
<i>Helichrysum caespitium</i> (DC.) Harv.	SS 78	Asteraceae	Bokgatha/Mabjana/Mmeetse	Entire plant	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day Mixed with <i>S. italica</i> (root) and pounded. Five teaspoons taken orally with a cup of warm water. Thrice a day	Gonorrhoea	3%
<i>Hypoxis hemerocallidea</i> (Fisch.) Mey. & Avé-Lall	SS 115	Hypoxidaceae	Titikwane/ sesogadi	Tuber	Pounded and five teaspoons taken orally with soft porridge. Thrice day Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day Mixed with <i>B. africana</i> (root), <i>C. verum</i> (root) and <i>G. aspera</i> (entire plant). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	12%
<i>Hypoxis obtusa</i> Burch. ex Ker Gawl.	SS 336	Hypoxidaceae	Monna maledu	Tuber	Mixed with <i>Z. mucronata</i> (root) and pounded. Five teaspoons taken orally in a cup of warm water. Thrice a day	Chlamydia	3%
<i>Ipomoea obscura</i> var. <i>obscura</i>	SS 200	Convolvulaceae	Kgomodimaswi	Root	Boiled for 5-20 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	1%
<i>Jatropha zeyheri</i> Sond.	SS 120	Euphorbiaceae	Unknown	Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	3%
<i>Kleinia longiflora</i> DC.	SS 217	Asteraceae	Lekgabolo/ motlalamaswi	Root	Boiled for 20 minutes and one tin cup of warm extract is administered by healer via bulb syringe. Once a day	Chlamydia	3%
<i>Myrothamnus flabellifolius</i> Welw	SS 111	Myrothamnaceae	Boka	Entire plant	Mixed with <i>E. maleolens</i> (entire plant) and pounded. Five teaspoons orally with soft porridge. Thrice daily for a week Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Opuntia ficus-indica</i> Mill.	SS 90	Cactaceae	Motloro	Root	Mixed with <i>Z. macronata</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Gonorrhoea	6%
<i>Pelargonium</i> spp.	SS 04	Geraniaceae	Selumi	Root	Boiled for 20 minutes and undisclosed volume of the extract taken orally. Thrice a day Pounded and six teaspoons taken orally with either warm water or porridge. Thrice a day	HIV/AIDS	3%

Table 2. Contd.

<i>Peltophorum africanum</i> Sond.	SS 13	Caesalpinaceae	Mosehla	Root	Mixed with <i>B. albitrunca</i> (root), <i>E. elephantina</i> (root) and <i>P. ciliatus</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	6%
				Bark	Mixed with <i>E. elephantina</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day		
<i>Plectranthus ciliatus</i> E. Mey. ex. Benth.	SS 322	Lamiaceae	Sehla sa pelo	Root	Mixed with <i>B. albitrunca</i> (root), <i>E. elephantina</i> (root), and <i>P. africanum</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Protea caffra</i> subsp. <i>caffra</i>	SS 341	Proteaceae	Unknown	Seeds	Pounded and six teaspoons taken orally in a cup of warm water. Thrice a day for a week.	Chlamydia	3%
<i>Sansevieria hyacinthoides</i> (L.) Druce	SS 199	Dracaenaceae	Makgotse	Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Sarcostemma viminale</i> subsp. <i>orangeanum</i>	SS 106	Apocynaceae	Mokwere-kwere- o-mogolo	Twigs	Mixed with <i>D. elata</i> (bulb), <i>E. elephantina</i> (root), <i>S. birrea</i> (bark), <i>E. transvaalense</i> (root) and <i>Z. capense</i> (root). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Sclerocarya birrea</i> sub sp. <i>birrea</i>	SS 01	Anacardiaceae	Morula	Bark	Mixed with <i>D. elata</i> (bulb), <i>E. elephantina</i> (root), <i>E. transvaalense</i> (root), <i>Z. capense</i> (root) and <i>S. viminale</i> (twigs). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
<i>Searsia lancea</i> (L.F.) F.A. Barkley	SS 227	Hyacinthaceae	Mokalabata/ Motshakhutshakhu	Root	Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	Nta	3%
					Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day		
<i>Senna italica</i> subsp. <i>arachoides</i>	SS 321	Caesalpinaceae	Mankgane/sebetsane	Root	Mixed with <i>H. hemerocallidea</i> (tuber) and pounded. Five teaspoons taken orally with a cup of warm water. Thrice a day	Gonorrhoea	6%
<i>Solanum panduriforme</i> E. Mey.	SS 85	Solanaceae	Mothola-ye- serolwane	Fruits	Chopped and macerated in warm water for 24 hours. One tin cup of decoction administered by healer. Twice a day	Gonorrhoea	6%
<i>Tribulus terrestris</i> L.	SS 409	Zygophyllaceae	Mosehlo	Entire plant	Mixed with <i>Z. mucronata</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Chlamydia	3%
<i>Triumfetta</i> spp.	SS 64	Tilliaceae	Unknown	Root	Mixed with <i>E. maleolens</i> (entire plant) and <i>Z. humile</i> (root). Pounded and five teaspoons taken orally with soft porridge. Thrice a day	HIV/AIDS	3%
					Mixed with <i>H. obtusa</i> (tuber) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day		
					Mixed with <i>T. terrestris</i> (entire plant) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day		
<i>Ziziphus mucronata</i> Wild.	SS 12	Rhamnaceae	Mokgalo	Root	Mixed with <i>E. pallidiflora</i> (bulb) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day	Chlamydia	18%
					Mixed with <i>O. ficus-indica</i> (root) and boiled for 20 minutes. One tin cup of the extract taken orally. Thrice a day		
					Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	Gonorrhoea	
<i>Zanthoxylum capense</i> (Thunb.) Harv.	SS 511	Rutaceae	Senokomaropa	Root	Mixed with <i>D. elata</i> (bulb), <i>E. elephantina</i> (root), <i>S. birrea</i> (bark), <i>E. transvaalense</i> (root) and <i>S. viminale</i> (twigs). Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day	HIV/AIDS	3%
					Boiled for 20 minutes and one tin cup of the extract taken orally. Thrice a day		
<i>Zanthoxylum humile</i> (E.A.Bruce) P.G. Waterman	SS 19	Rutaceae	Monokwane	Root	Mixed with <i>E. maleolens</i> (entire plant) and <i>Triumfetta</i> spp. (root). Pounded and five teaspoons taken orally with soft porridge. Thrice a day	HIV/AIDS	6%

Table 2 indicate that 25 plant species are used to treat HIV/AIDS, 18 to treat gonorrhoea, eight to treat chlamydia, and one to treat nta and syphilis each. Twenty eight species were documented in the Waterberg district, 17 in the Sekhukhune

district, and 12 in the Capricorn district. Eighty seven percent of the 47 recorded species are used to treat a single STI (Table 2), with just 13% used to treat two STIs, these include *Aloe marlothii* (gonorrhoea and chlamydia), *Callilepis*

salicifolia (gonorrhoea and HIV/AIDS), *Cucumis myriocarpus* subsp. *leptodermis* (gonorrhoea and syphilis), *Drimia elata* (gonorrhoea and HIV/AIDS), *Hypoxis hemerocallidea* (gonorrhoea and HIV/AIDS) and *Ziziphus mucronata* (gonorrhoea

and *nta*). With the exception of *Catharanthus roseus* (82%), used to treat gonorrhoea, no other species were used with the same consistency by traditional healers in the three districts.

Plant parts used in remedy preparation

Roots (58%) were mostly used to prepare remedy for STIs, followed by entire plant (12%), tuber (10%), bulb (6%), leaf and bark (4% each), seed, twig and fruit (2% each). When herbs are used to prepare remedies it is mostly their tubers or roots; however, in some cases the entire plant can be used. Roots are also the preferred plant part when shrubs are used to prepare herbal remedies. In rare cases the entire plant are used. It is notable that the roots are mostly used when plant material is collected from trees, with very little focus on bark, leaves, seeds or twigs. Bulbs and tubers are mostly obtained from perennial geophytes.

Single vs. multiple plant extracts

Twenty nine single plant extract and 40 multi plant extract preparations were recorded (Table 2). Nine plant species were used in single and multi-extract preparations. Among the multi extracts, 67% of healers employ two species, 13% three species, 13% four species and 7% six species. It is noteworthy that all extracts exceeding two species are used to treat HIV/AIDS. Twenty five of the 40 multi extract preparations are used to treat HIV/AIDS, seven to treat gonorrhoea and chlamydia.

Preparation, administration and dosage of remedy

Various preparation methods, such as boiling, pounding and maceration are used by Bapedi traditional healers. There is a clear preference for boiling, as almost 80% of all preparations are boiled. The boiling of plant materials ranges from 5 to 20 minutes (depending on an individual healer).

Often the traditional healers opted to pound (14%) the plant material, whereas only a small number used maceration (6%). These healers use either stones or crushing metals. Maceration is normally done over a period of 24 hours. The maceration medium might differ, as some healers use warm water whereas other healers use cow's milk at room temperature.

This study clearly illustrate that oral self-administration (96%) is the method of choice. However, sometimes especially with rectal administration (enema) (4%), via bulb syringe, the healers did the administration. Extracts are normally administered as a fluid, but in the event of pounded material either a fluid (water) or soft porridge can be used. Extracts are normally stored in 2 L plastic

containers, and then consumed using a tin cup. In general one cup three times per day for a period of one week was adhered to. Powered medicines are stored in 400 gram containers, wrap in newspaper, cloth or plastic bags.

DISCUSSION

Sexually transmitted infection identification

As early as 1966, Bryant in his book on the *materia medica* of the Zulu tribe recorded an important phenomenon. He concluded that indigenous knowledge systems functioned on the premise that the symptoms equalled the ailment, and therefore focussed on symptomatic treatment rather than on the root cause of the symptoms. This is currently still the *status quo* as traditional healers treat symptoms, because asymptomatic people do not come for consultation.

With the exception of healers in two municipalities (Tubatse and Bela-Bela), all other healers treat gonorrhoea. Although 10 (33%) traditional healers indicated that they use unprotected sexual intercourse with an infected person in combination with a smelly urethral discharge to identify gonorrhoea. Most traditional healers (73%) rated unprotected sexual intercourse with multiple partners in combination with a smelly urethral discharge of greater importance in the identification process. The use of an abnormal urethral discharge concurs with the genital symptoms reported by Darj et al. (2010). Their study, focusing on the presentation of infected females at rural and urban clinics in Uganda, indicated that an abnormal vaginal discharge was the most prevalent symptom (75% urban vs. 84% rural), followed by genital itching and sores.

It is not surprising that unprotected sexual intercourse, either with an infected person or with multiple partners, formed part of the identification process as many initiatives in the media promote the use of condoms as a protective means. Unfortunately this study did not address the consistency of condom use or how many of the patients had multiple partners or an infected partner, as these aspects fell outside the scope. Sexual partnerships do have an impact on the spread of STIs such as gonorrhoea, syphilis (Kretzschmar and Morris, 1996) and HIV/AIDS (Morris and Kretzschmar, 1997).

Seventeen healers from 10 local municipalities treated HIV/AIDS. This in itself was surprising as one would have expected that of all the STIs treated, HIV/AIDS would have been the top priority as it is very prevalent in the studied areas (Igumbor et al., 2003). HIV/AIDS produces gradual effects on the human body's immune responses resulting in the development of cancers and opportunistic infections (Vermani and Garg, 2002). The list of symptoms associated with this disease is exhaustive, but the more prominent ones are persistent fever, night sweat,

wasting syndrome, headache, skin rashes, diarrhoea, thrush, Kaposi's sarcoma, *Candida* esophagitis (Kapusnik-Uner, 1996) and disseminated atypical mycobacterial infection (Murray and Pizzorno, 1999). Typically its identification, in this study was based on a combination of behavioural traits and accompanying symptoms. The behavioural aspects were straight forward and most traditional healers agreed that unprotected sexual intercourse with an infected person or the partner of a person who died of HIV/AIDS would increase the likelihood of being infected. The diagnostic criteria were a huge disappointment as weight loss (wasting syndrome) was the only consistent symptom used. This disappointment stems from the fact that so many symptoms exist that it is difficult to believe that the traditional healers would base the diagnosis of this dreadful disease on a single symptom, and the fact that weight loss can result from any number of conditions, including, but not limited to HIV/AIDS. One traditional healer from Modimolle municipality had a different approach to the identification of HIV/AIDS infection. He listed exposure to contaminated blood as the cause and excluded sexual activities as contributing factors. Wasting syndrome did not feature among the symptoms; however, his list included coloured ligaments (green), prolonged flu-like symptoms and a feeling of dizziness on hot days. It seems reasonable to say that the coloured ligaments and dizziness does not make sense, and that the prolonged flu-like symptoms can at least partially be accepted as one of the diagnostic criteria.

Chlamydia was less often treated and only five of the 17 municipalities had traditional healers who treated it. Why most of these traditional healers (3/5 municipalities) reside in the Capricorn district is as yet not clear, and needs to be elucidated. Seven of the nine traditional healers who treated this disease mentioned that their patients had an abnormal gait ("stretch legs when walking") as well as an inability to urinate. Exposure to blood seems to play an important role in contracting this disease, as unprotected sexual intercourse with menstruating partners or one who just terminated her pregnancy was clearly indicated as a risk factor. This can lead to urogenital infections, which in turn can, to an extent, explain the inability to urinate. The phrase "stretch legs when walking" seems to be significant as 78% of the traditional healers referred to it exactly like this. The phenomenon itself needs further investigation.

Nta and syphilis were exclusively (indicating its prevalence in this district) treated by traditional healers from the Sekhukhune district. *Nta* was treated by traditional healers from the Elias Motsoaledi municipality, who used unprotected sexual intercourse with many partners as a means of identifying this ailment. No accompanying symptoms were recorded. The use of unprotected sexual intercourse for identification purposes is very vague as most of the other listed ailments also include it. Similar to this is a single traditional healer from the Groblersdal

municipality who used unprotected sexual intercourse with many partners in his identification of syphilis. In addition to this it was mentioned that patients had many measles on their genitals. It is very difficult to say with certainty what is meant with "measles". The fact that it seems to be confined to the genital area creates more confusion. The only reasonable explanation is syphilis, as a skin rash does appear during the secondary stage (Jones and Lopez, 2006). This skin rash appears all over the body, is painless and does not itch. As a result of this, there is a possibility that both the traditional healers and patient could have overlooked it, simply because traditional healers, in the case of an STI, would not necessarily associate a rash on other body parts with an STI, and the patient, due to a lack of discomfort, might not mention it.

Plant species used to treat sexually transmitted infections

Bapedi traditional healers used 47 species of plants to treat chlamydia, gonorrhoea, HIV/AIDS, *nta* and syphilis. The presence of such a large number of plant species and their associated ethno medicinal knowledge indicates that the study area has a higher diversity of medicinal plants and that indigenous knowledge regarding STIs of traditional healers in this area compare favourably with findings of De Wet et al. (2012) in northern Maputaland, KwaZulu-Natal Province (South Africa).

The dominant families in this study were: Asteraceae (9%), Asphodelaceae, Fabaceae and Hyacinthaceae (6% each). Although not reported to exclusively treat STIs, these families are consistently recorded as mostly used in different ethno medicinal inventories. Species from the Asteraceae and Asphodelaceae families were dominant in a study conducted in the Agter-Hantam, Northern Cape Province (De Beer and Van Wyk, 2011). The Hyacinthaceae were also reported to be one of the most used plant families in the Eastern Cape Province (Koduru et al., 2007). However, a number of studies (Kambizi and Afolayan, 2001; Hossan et al., 2010) focussing on STIs reported the dominance of Fabaceae. These studies concluded that since the Fabaceae provided the highest number of species, it might be an important family for STIs and medicinal plants in general. The preference of the Asphodelaceae and Asteraceae families in this study could be attributed to their wide distribution range, large number of taxa and plant numbers (Thomas et al., 2009). According to Jones (1998) the wide use of Asteraceae in traditional medicine is linked to the wide range of biologically active compounds it contains. Heinrich et al. (1998) concluded that the widespread use of species from this family might be linked to the fact that it is one of the largest families in the plant kingdom.

With the exclusion of *nta* and syphilis, Bapedi traditional healers treated all STIs with more than one species.

For instance HIV/AIDS was treated with 25 species, gonorrhoea with 18 species and chlamydia with eight. This ability to use many different species to treat a specific STI creates functional redundancy and facilitates resilience by increasing the likelihood for substitution if a particular plant is unavailable. Nevertheless, the high number plant species used by Bapedi traditional healers to treat HIV/AIDS was expected as currently there is no cure for this dreadful disease. These healers perhaps have been using plants for the symptoms but not the disease itself because it was unknown.

The majority of the plant species in this study was documented in the Waterberg district (28 spp.) and Sekhukhune district (17 spp.). Only 12 species was recorded in the Capricorn district. The degree of use could be linked to their distribution, abundance and/or intra cultural differences; an aspect that warrants further investigation.

Eighty seven percent of the 47 recorded species are used to treat a single STI (Table 2). The dominant use of a single species by Bapedi traditional healers perhaps has its advantages from a conservation point of view. This is because although the indigenous species are under threat, it is at least not under threat from being multi-used as well. However, Hossan et al. (2010) noted that using a variety of species against a particular ailment suggest that the disease is quite prevalent. In the current study 13% of species were used to treat two STIs, this includes *A. marlothii* (gonorrhoea and chlamydia), *C. salicifolia* (gonorrhoea and HIV/AIDS), *C. myriocarpus* (gonorrhoea and syphilis), *D. elata* (gonorrhoea and HIV/AIDS), *H. hemerocallidea* (gonorrhoea and HIV/AIDS) and *Z. mucronata* (gonorrhoea and nta).

With the exception of *C. roseus*, used to treat gonorrhoea, no other species is used with the same consistency by traditional healers in the three districts. The reason for this is currently unknown; however, Van Wyk and Wink (2004) noted that one of the recognised evidences of efficacy and safety of an indigenous remedy is its widespread use for treating an ailment. Therefore, it is acceptable to postulate that *C. roseus* might be widely preferred by Bapedi traditional healers due to its efficacy against gonorrhoea. The use of this species to treat unspecified venereal diseases was previous reported for the Venda region, Limpopo Province, South Africa (Mabogo, 1990) and unspecified areas in Southern and Eastern Africa (Watt and Breyer-Brandwijk, 1962). Therefore, it might be possible that in the Venda region and Southern and Eastern Africa *C. roseus* is used for gonorrhoea. This is because venereal disease is a collective term for STIs.

Some medicinal species used by Bapedi traditional healers to treat STIs have been validated through scientific research or through their extensive use by various cultures in South Africa and other parts of Africa. For instance, the use of *T. terrestris* to treat chlamydia by Bapedi traditional healers is similar to that reported by

Mabogo (1990) in the Venda region. However, there is a difference between Vha-Venda and Bapedi with regard to the parts used. Bapedi healers prefer using the whole plant (flowers, fruit, stem, leaf and root), while Vha-Venda healers only use the leaves (Mabogo, 1990). Cultural and indigenous knowledge differences between Bapedi and Vha-Venda concerning the use of plant parts might have contributed to the observed variations.

Furthermore, Bapedi traditional healers use the root of *C. papaya* to treat gonorrhoea. A similar finding was previously reported for the Venda region (Arnold and Gulumian, 1984), and the northern Maputaland, KwaZulu-Natal Province of South Africa (De Wet et al., 2012). However, there are clear differences between Bapedi, Vha-Venda healers and lay people regarding the plant parts used. Bapedi and Vha-Venda prefer to orally prescribe extracts prepared from root, while lay people prefer to use extracts made from the leaves. Therefore, it can be argued that knowledge of its medicinal use varies according to geographical location. This is because both Bapedi and Vha-Venda healers inhabit the same area (Limpopo Province), while lay people (KwaZulu-Natal Province) are located some distance from both the Bapedi and Vha-Venda. In other parts of Africa leaves of *C. papaya* are commonly the preferred part to treat unspecified STIs (Abbiw, 1990; Ndubani and Hojer, 1999). These studies verify the use of this species by Bapedi traditional healers in the treatment of STIs. The use of *T. terrestris* by Bapedi traditional healers to treat STIs corresponds with findings of Mabogo (1990). This similarity is of significance, because identical species-use by different cultures may be a reliable indication of curative properties. *T. terrestris* demonstrated antibacterial activity against *Enterococcus faecalis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* (Al-Bayati and Al-Mola, 2008). The use of *H. hemerocallidea* by Bapedi traditional healers to treat HIV/AIDS and gonorrhoea correspond with findings of Puranwasi (2006) and De Wet et al. (2012) who reported its use to treat HIV/AIDS by the Zulu people in northern Maputaland. Singh (1999) furthermore reported the extensive use of this species by Zulu traditional healers in the treatment of urinary infections caused by STIs. It is also interesting to note that pharmacological activities of extracts from this species resulted in the extraction of β -sitosterol and β -sitosterol glycoside, which showed a significant decrease in plasma viral loads and stabilized CD-4⁺ cell counts over a period of 40 months in HIV positive patients (Bouc et al., 1999). This finding supports the use of *H. hemerocallidea* by both Bapedi and Zulu healers to treat HIV/AIDS, as well as other South Africans (Babb et al., 2007) who use this species to manage this virus. Conservation measures should be taken as this species is nationally threatened (SANBI, 2001).

Ziziphus mucronata is used in this study to treat both chlamydia and gonorrhoea. Hutchings et al. (1996)

reported its use by Zulu healers to treat gonorrhoea only. No South African literature could be located to support its use by Bapedi healers to treat chlamydia. Available South African literature indicates its use to treat infertility and nerve pains by Vha-Venda healers (Mabogo, 1990), diarrhoea by Xhosa healers (Appidi et al., 2008) and as medicine to bring a good relationship with ancestors by Zulu healers (Ndawonde, 2006). In other parts of Africa, *Z. mucronata* is widely used to treat oral infections (Gundidza, 1986; Runyoro et al., 2006; Tapsoba and Deschamps, 2006).

To the best of our knowledge *C. decapetala* (gonorrhoea), *E. elephantina* (HIV/AIDS), *Z. mucronata* (chlamydia), *A. pungens* (gonorrhoea), *B. africana* (HIV/AIDS), *C. verum* (HIV/AIDS), *C. lanatus* (HIV/AIDS), *E. crispa* (HIV/AIDS), *E. maleolens* (HIV/AIDS), *G. aspera* (HIV/AIDS), *P. ciliatus* (HIV/AIDS), *P. caffra* (chlamydia), *S. lancea* (Nta), *S. viminale* (HIV/AIDS), *Z. capense* (HIV/AIDS) and *Z. humile* (HIV/AIDS) are reported for the first time in the treatment of the investigated STIs. This survey has made a major contribution in the plant species used traditionally for the treatment of STIs in South Africa and worldwide. It also offers considerable opportunities for further scientific research.

Plant parts used in remedy preparation

Data from this study illustrates a preference for the use of roots (58%) and entire plant (12%). This finding is almost similar to that reported by De Wet et al. (2012) in northern Maputaland. They noted the dominance of roots (25%), followed by leaves and whole plant (18%) in the treatment of STIs. However, Hossan et al. (2010) reported the dominance of root and leaves in their study which was conducted in Bangladesh. The wide use of the roots by Bapedi traditional healers to prepare medicine is based on the perception that more healing power is stored in this part (Semenya et al., 2012). Furthermore, their extensive use of entire plants (12%) was because they want to utilize all plant parts (roots parts, leaf and flower) concurrently. However, wide utilization of both roots and entire plant use has serious consequences from both ecological point of view and from the survival of the medicinal plant species as was observed in by Birhanu (2002) in Jabitehaan Wereda, West Gojam. Therefore, research should also be undertaken, to establish if substitute parts (such as leaves) have the same efficacy as other parts of the plant. It is reasonable to state that the limited use of seeds and fruits (2% for each) by Bapedi healers might be due to their seasonal availability.

Single vs. multiple plant extracts

Forty preparations were drawn from mixtures of different

species for the treatment of a single STI. For instance the root of *Z. mucronata* were mixed with either a bulb of *E. pallidiflora* or a tuber of *H. obtusa* to treat chlamydia, or a root of *O. ficus-indica* to treat gonorrhoea. The practice of combining different species to treat a single STI was also reported by De Wet et al. (2012) for Zulu lay people. They found that 33 species are used in 23 different combinations of two or more species per herbal remedy for the treatment of a single STI. For example leaves of *C. papaya* were mixed with *Senecio serratuloides* (leaf) and a tuber of *H. hemerocallidea* to treat gonorrhoea. In the current study the combination of a root of *C. papaya* with a tuber of *C. myriocarpus* is a remedy for gonorrhoea. Bapedi healers indicated that they combine species to re-enforce the medicines and increase its efficacy. This observation is in agreement with the study by Mabogo (1990) for Vha-Venda traditional healers. It is interesting to note that pharmacological studies support this claim (Chow et al., 2003). This was further scientifically validated by Otieno et al. (2008), they evaluated this practice by mixing root extracts of *Catha edulis*, *Eucomis natalensis*, *Harrisoni abyssinica* and *Ximania caffra* against single extracts of the same species. Multi-species extracts inhibited all tested bacterial species, while single extracts inhibited only three of them. Eight out of ten multi-species extracts were bactericidal, while only two out of four single extracts were bactericidal. Therefore it is reasonable to state that the Bapedi practice of combining medicinal species to treat a single STI might be effective.

Twenty nine single extract were used to treat one or more STIs. For instance, *A. marlothii* is used to treat gonorrhoea, HIV/AIDS, and chlamydia by Bapedi healers in various surveyed areas, while species such as *H. obtusa* (chlamydia), *S. hyacinthoides* (HIV/AIDS) and *Pelargonium* species (HIV/AIDS) were exclusively used for a single STI (Table 2). The use of single species in the preparation of remedies was also reported by Fernandes et al. (2008) for the Venda region. For instance, *C. roseus*, *P. africanum* and *S. panduriforme* were amongst the species used by Venda healers to treat unspecified venereal diseases and infectious diseases (Fernandes et al., 2008). The preference of a single species by Bapedi healers in the preparation of extracts might be linked to their local availability. In the Southern Tigray, Northern Ethiopia, Giday and Gobana (2003) postulated that the wide utilization of a single plant species in the preparation of indigenous remedies by healers is ascribed to the differences in the socio-cultural landscapes, indigenous knowledge on synergetic effect of different medicinal plants and vegetation types. Saikia et al. (2006) reported that use of a single species in the preparation of an extract could be of great interest for the development of novel drugs as the exploration of therapeutic activity-bearing ingredients may be easier. However, the use of a single species by Bapedi healers in the preparation of extracts has both advantages and disadvantages from a conservation point of view. As

noted earlier when used to treat a single STI it reduces harvesting pressure of being multi-used, likewise the opposite increases harvesting, thereby posing a threat.

Preparation, administration and dosage of remedy

Various preparation methods, such as boiling, pounding and maceration are used by Bapedi traditional healers. These are the most common methods of medicinal preparation used for STIs in South Africa (De Wet et al., 2012) and other African countries (Njoroge and Bussmann, 2009). Eighty percent of the plant material in this study was boiled in water. De Wet et al. (2012) and Njoroge and Bussmann (2009) also noted the preference for boiling material. This might be due to the simplicity of preparation. Some Bapedi healers (14%) opted to pound dried plant materials. However, the low occurrence of pounding of medicinal material by Bapedi healers was expected as producing powders is a labour intensive process; the herbs must be cut into very small pieces, dried sufficiently to make them brittle, and then crushed intensively enough to reduce them to a reasonably fine powder. In central zone of Tigray, Northern Ethiopia, Yirga (2010) noted that the preference of pounding plant materials is driven by the scarcity of the plant in nature, and that healers preserve the plants that they could not easily find in communal areas. The same can be true with some of the threatened and declining (SANBI, 2001) species used by Bapedi healers. These species include *H. hemerocalidea* (declining) and *E. maleolens* (least concern), which were occasionally processed by pounding. The limited use of maceration, normally a 24-hour procedure, as a preparation method by Bapedi healers might be due to its long preparation time.

Findings of this study illustrate that oral self-administration (96%) was the method of choice. Studies such as Kambizi and Afolayan (2001) and Chigora et al. (2007) also noted that most medicines used in the treatment of STIs are prescribed orally. The preference of this method by Bapedi traditional healers might be due to the fact that medication in liquid form is already dissolved, so it can readily be absorbed by the human body. Occasionally, Bapedi healers administered medication rectally (6%) using a bulb-syringe; in such cases the traditional healers did the administration. The limited use of this method by Bapedi healers came as no surprise as they mentioned that it is very dangerous and mostly used by more experienced traditional healers. They agreed that incorrect dosages (too much) can be fatal.

Extracts are normally stored in 2 L plastic containers, and then consumed using a tin cup. In general one cup three times per day for a period of one week was adhered to; this is in line with the standard prescriptions in western medicine. However, traditional dosage remedies of Vha-Venda healers depend on the physical appearance of the patient and experience of individual healers (Mabogo, 1990). This finding was also reported in

different parts of Ethiopia by studies such as Addis et al. (2001) and Teklehaymanot et al. (2008). The lack of use of standard/measured doses, and the large volumes of the doses used are difficult to manage. This may be dangerous as some of the species could have a high degree of toxicity, and overdose might cause serious health problems. It is interesting to note that Bapedi traditional remedies have precision with regard to dosage. This is because most of the remedies are prepared using similar species, method of preparation, administration and dosage (Table 2).

Conclusion

The present study revealed that Bapedi traditional healers possess a good knowledge of STIs identification. However, their diagnosis of STIs is based primarily on the presentation of symptoms, which is not always accurate. This is because some of the patients might have symptoms similar to STIs but are not necessarily infected; consequently traditional healers might prescribe incorrect and ineffective medication. However, given proper guidance and education, traditional healers could serve as an important source of information and can be incorporated in community-based STI prevention. The large number of species employed to treat STIs clearly reflects the diversity of treatment protocols used by Bapedi healers. In the treatment of the more prominent STIs, a number of alternative species can be used, which in itself will ensure that treatment options will always be available. Further studies to determine the efficacy of some of the recorded species against the reported STIs is strongly recommended.

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