

Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

PHYTOMEDICINE VERSUS GONORRHOEA: THE BAPEDI EXPERIENCE

Lourens Johannes Christoffel Erasmus^a, Marthienus Johannes Potgieter^{b1}, Silas Sebua Semenya^{b2}, Sandra Janet Lennox^{b3}.

Departments of ^aPhysiology and Environmental Health and ^bBiodiversity, School of Molecular and Life Sciences, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa,

^aE-mail: Lourens.Erasmus@ul.ac.za; ^{b1}E-mail: Martin.Potgieter@ul.ac.za; ^{b2}E-mail: Sebuasemenya@gmail.com; ^{b3}E-mail: lennoxps@netactive.co.za

Abstract

Records regarding the phytomedicine employed by the Bapedi are almost non-existent. This is the first study of herbal remedies used by Bapedi traditional healers to treat gonorrhoea, of concern as it is a danger to reproductive health. A semi-structured questionnaire, centred on sexual health, was administered to 30 traditional healers in 15 local municipalities across the three districts of Limpopo Province during 2009/10. The questionnaire focussed on the use of plants for medicine as well their application in reproductive health management. This investigation found that the Bapedi employed no less than 18 different plant species, sometimes as multiple-plant extracts, but more often as single-plant extracts. The single most used species was *Catharanthus roseus*, which accounted for 60% of all reported cases, followed by *Aloe marlothii* subsp. *marlothii* (13.3%). Both these species occur abundantly throughout the province and are currently not threatened. This is the first record for the use of *Callilepis salicifolia*, *Jatropha zeyheri* and *Cotyledon orbiculata* to treat gonorrhoea by people of any culture.

Key words: Bapedi, gonorrhoea, Limpopo Province, sexually transmitted disease, reproductive health.

Introduction

Approximately 62 million cases of gonorrhoea are annually diagnosed worldwide (Sherrard, 2010). The causative pathogen, *Neisseria gonorrhoea*, is a Gram-negative diplococcus with the ability to infect mucosal surfaces (Sherrard, 2010), especially that of the urogenital tract (Van Vuuren and Naidoo, 2010). This pathogen is primarily transmitted via vaginal, anal and oral sex, and there seems to be more efficient transmission from males to females (Sherrard, 2010).

Treatment of sexually transmitted infections poses many challenges in developing countries (Lichtenstein, 2003; Mårdh, 2004). In response, the World Health Organisation (1991) introduced syndromic management guidelines. This strategy primarily focuses on treating patients according to the symptoms they present, rather than delaying treatment until laboratory test confirmation of the infection. Traditional healers face the same situation; they are an important component of the comprehensive healthcare strategy (Kambizi and Afolayan, 2001), and have to diagnose and treat according to symptomatic presentation; without access to accredited laboratory facilities.

The traditional healer, similar to current western medicine, obtains a medical history, which indicates possible risky sexual behaviours (O'Farrell et al., 1991). As a diagnostic tool the healer checks for the presence of abnormal urethral discharge, dysuria and/or genital ulcers (Wilkinson et al., 1998). Once diagnosis is completed, treatment commences; primarily using herbal remedies influenced by the customs of the specific ethnic group, as well as by the plant diversity of their specific geographical region.

The practice of African traditional medicine is arguably the oldest and most diverse of all the medicinal systems (Gurib-Fakim, 2006). Van Wyk (2002) argued that African traditional knowledge systems being oral are fragile. Documenting African, including South African, plant species used to treat ailments is becoming increasingly urgent due to poor recording practice. South Africa has a rich floral biodiversity including approximately 4000 plant species with medicinal properties (Van Wyk and Gericke, 2000) therefore it is not surprising that an estimated 80% of the South African population rely on plant medicines for their healthcare requirements (Jäger et al., 1996).

Most of the phytomedicine research has been for the larger recognised ethnic groups such as the Zulu (Jäger et al., 1996; Kelmanson et al., 2000; Reid et al., 2006; De Wet et al., 2010; Corrigan et al., 2011; De Wet et al., 2011; York et al., 2011), Venda (Steenkamp et al., 2007; Mulaudzi et al., 2011), Sotho (Magee et al., 2007) and Xhosa (Bhat and Jacobs, 1995), but there is no *materia medica* for the Bapedi. Although the Bapedi are one of the largest ethnic groups in South Africa, no information regarding their *materia medica* could be found. According to our

Publisher: African Networks on Ethnomedicines

Web page: <http://journals.sfu.ca/africanem/index.php/ajtcam/index>

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

knowledge, based on a thorough literature search, this is the first comprehensive scientific report on the herbal remedies used by Bapedi traditional healers to treat gonorrhoea.

Methodology

Study area and study population

The study area (Figure 1) is situated in the Limpopo Province, in the far north of South Africa. Data was collected from three districts (Capricorn, Sekhukhune and Waterberg) covering 15 local municipalities (Table 1). These districts were selected due to their sizable population of Bapedi. A total of 30 traditional healers (2 per local municipality) were randomly selected from these local municipalities.

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



Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

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

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

The Bapedi as a cultural group resides primarily in the central, southern and western parts of the Limpopo Province, South Africa. They constitute the dominant ethnic group in this province.

Ethnobotanical survey

This ethnobotanical study on Bapedi phytomedicine was conducted from July 2010 to February 2011. Prior informed consent was obtained from all participating traditional healers. The questionnaire was used to obtain information regarding plants used, plant parts used, method of preparation as well as prescription. Processed plant material were collected, and identified in the Larry Leach Herbarium (UNIN) at the University of Limpopo (Table 2). No specimen voucher numbers were allocated, as photo records exist.

Data analysis and reporting

Descriptive statistics, such as percentages and frequencies, were used to analyse the data obtained from the questionnaires. The data was organised and analysed using the statistical program SPSS version 14.0.

Results

Gonorrhoea and its diagnosis

The most frequently (96%) mentioned symptom was a smelly urethral discharge. This was combined with behavioural observations. Patients were asked by traditional healers to reflect on risky sexual behaviours such as multiple sexual partners, failure to use condoms, and sexual intercourse with infected partners.

Frequency of use of medicinal plants

The survey documented 18 plant species, from as many genera and families that were used by Bapedi traditional healers to treat gonorrhoea. Twenty nine extracts were prepared from these species; 31% of these included the single extract use of *Catharanthus roseus* (L.) G. Don, whereas the 10% of *Aloe marlothii* A. Berger subsp. *A. marlothii* were equally distributed between single- and multi-extract uses.

Most participating traditional healers (60%) included *Catharanthus roseus*, pink form, as part of their treatment protocol. Whereas 80% of the traditional healers in Sekhukhune district preferred to use *Catharanthus roseus*, less than half (40%) of the traditional healers in the Waterberg district used this species. Traditional healers from Modimolle municipality preferred the white form. In the case of *Aloe marlothii* subsp. *Marlothii*, only a select few of the participating healers (9%), included the species in the treatment of gonorrhoea.

The 18 plant species used in the preparation of 29 different extracts; consisted of single- or multi-extract preparations. Four of the 29 are combinations utilizing multiple extracts; three of these were from the Waterberg district and two of these were from Lephalale municipality. The remaining multi-extract preparation was used in the Aganang municipality (Capricorn district); as opposed to Sekhukhune district where only single-extracts were used.

To the best of our knowledge, and after careful scrutiny of existing literature, this is a first record of *Callilepis salicifolia* Oliv., *Cotyledon orbiculata* L. var. *orbiculata* and *Jatropha zeyheri* Sond. used as single-extract preparations to treat gonorrhoea. Exclusive to Capricorn district *Callilepis salicifolia* (Lepelle-Nkumpi municipality) and *Cotyledon orbiculata* (Polokwane municipality) are used as alternatives to *Catharanthus roseus*, to treat gonorrhoea. Here, *Cotyledon orbiculata* is only used to treat gonorrhoea, however, *Callilepis salicifolia* is also used to treat HIV and leukemia. Similarly, in Groblersdal (Sekhukhune District) *Jatropha zeyheri* and *Senna italica* (Miller) F.W. Andrews serve as alternatives to *Catharanthus roseus*.

Plant parts utilized and mode of preparation

Plant parts used for the preparation of herbal remedies were roots, tubers, bulbs, and fruit, and in one case the entire plant (Tables 2 and 3). Roots were most frequently used (50%), followed by tubers (28%) and bulbs (11%). Most of the plants used were herbs (61%) with an almost equal distribution between shrubs (28%) and trees (22%).

Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

Regardless of habit, a significant preference (88%) for underground parts was observed. When investigating herbs, roots constituted 36% of plant material used by all interviewed traditional healers. This is similar to the use of tubers. In contrast to this, roots constitute a significant proportion of the parts used from shrubs (75%) and trees (66%).

Boiling plant material is preferred (83%), followed by maceration (10%) and grinding (7%), to prepare herbal remedies used to treat sexually transmitted diseases. Primarily using water, boiling times range from 5 to 20 minutes. Maceration is done for 24 hours without exception, either in water or cow's milk. The milk preparation is used only in the Thabazimbi municipality.

Table 2: Plant species used by Bapedi traditional healers to treat gonorrhoea.

Scientific name	Vernacular name (Pedi)	UP	Frequency (%)
<i>Aloe marlothii</i> subsp. <i>marlothii</i> (Asphodelaceae)	Sekgophasagoema	R	13.3
<i>Alternanthera pungens</i> Kunth (Amaranthaceae)	Motsweetswe	T	3.3
<i>Caesalpinia decapetala</i> (Roth) Alston (Fabaceae)	Mokgabane	R	3.3
<i>Callilepis salicifolia</i> Oliv. (Asteraceae)	Phelana	T	3.3
<i>Carica papaya</i> (L.) (Caricaceae)	Mophopho "wapoo"	T	3.3
<i>Catharanthus roseus</i> (Apocynaceae)	Lepolomo le pinki la drop	R	60
<i>Cotyledon orbiculata</i> (Grassulaceae)	Pigs ear	R	6.7
<i>Cucumis myriocarpus</i> Naudin subsp. <i>myriocarpus</i> (Cucurbitaceae)	Mogapyana	T	3.3
<i>Dioscorea sylvatica</i> Eckl. var. <i>sylvatica</i> (Dioscoreaceae)	Monamela	B	3.3
<i>Drimia elata</i> sp. Jacq. (Hyacinthaceae)	Sekanama	B	3.3
<i>Helichrysum caespititium</i> (DC.) Harv. (Asteraceae)	Mabjana, matsšana, mmetse	EP	3.3
<i>Hypoxis hemerocallidea</i> Fisch. Mey. & Ave-Lall. (Hypoxidaceae)	Sesogadi	T	6.7
<i>Ipomoea obscura</i> Ker Gawl. var. <i>obscura</i> (Convolvulaceae)	Kgomodimaswi	R	3.3
<i>Jatropha zeyheri</i> Sond. (Euphorbiaceae)	Unknown	R	3.3
<i>Opuntia ficus-indica</i> (L.) Mill. (Cactaceae)	Motloro	R	6.7
<i>Senna italica</i> Mill. (Fabaceae)	Sebetšana	R	6.7
<i>Solanum panduriforme</i> E.Mey. (Solanaceae)	Thola ye serolwane	F	6.7
<i>Ziziphus mucronata</i> (Rhamnaceae)	Mokgalo	R	6.7

UP, used part; R, roots; T, tubers; B, bulbs; F, fruit; EP, entire plant.

Frequency = (n/N)100, n, number of traditional healers who quoted the species; N, total number of traditional healers interviewed.

Administration of remedies

Almost all extracts and decoctions in this study were taken orally; an enema was indicated by a single traditional healer. Extracts were generally taken three times a day via a tin cup. The use of a tin cup was significant because of the ancestral belief that it increases the potency of the extracts. Remedies were taken three times a day during the main meals of the day for a period of one week. In Lephalale municipality, a traditional healer ground *Senna italica* roots and *Hypoxis hemerocallidea* tubers which were dissolved in a cup of warm water without maceration or boiling.

Table 3. The mode of preparation used by traditional healers from different local municipalities.

Local municipality	Mode of preparation and administration
Aganang	Equal amounts of combined <i>Aloe marlothii</i> subsp. <i>marlothii</i> (root) and <i>Dioscorea sylvatica</i> var. <i>sylvatica</i> (bulb), or <i>Aloe marlothii</i> subsp. <i>marlothii</i> (root), cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Blouberg	<i>Drimia elata</i> (bulb) cooked for 10 minutes or <i>Caesalpinia decapetala</i> (root) cooked. A cup of the extract taken orally three times a day for a week.
Lepelle-Nkumpi	<i>Catharanthus roseus</i> (root) or <i>Callilepis salicifolia</i> (tuber) cooked for 5 minutes. A cup of the extract taken orally three times a day for a week.
Molemole	<i>Catharanthus roseus</i> (root) or <i>Ziziphus mucronata</i> (root) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Polokwane	<i>Catharanthus roseus</i> (root) cooked for 5 minutes. A cup of warm extract administered via bulb syringe by the healer. Or <i>Cotyledon orbiculata</i> (root) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Elias Motsoaledi	<i>Catharanthus roseus</i> (root) cooked for 20 minutes. A cup of the extract taken three times a day for a week.
Fetakgomo	Either <i>Catharanthus roseus</i> (root), <i>Opuntia ficus-indica</i> (root) or <i>Helichrysum caespititium</i> (entire plant) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Groblersdal	Either <i>Catharanthus roseus</i> (root) or <i>Senna italica</i> (root) or <i>Jatropha zeyheri</i> (root) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Makhuduthamaga	<i>Aloe marlothii</i> subsp. <i>marlothii</i> (root) cooked for 20 minutes. After being cooked, 5 teaspoons of potassium permanganate is added to the extract (2 L bottle). A cup of the extract taken orally three times a day for a week. Or <i>Solanum panduriforme</i> (fruits) chopped and macerated in warm water for 24 hours. A cup of this decoction is taken twice a day for a week.
Marble Hall	<i>Catharanthus roseus</i> (root) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Lephalale	<i>Ipomoea obscura</i> var. <i>obscura</i> (root) or combined equal amounts of <i>Carica</i> papaya and <i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i> (tuber) cooked for 20 minutes. A cup of the extract taken orally three times a day. Or <i>Senna italica</i> (root) and <i>Hypoxis hemerocallidea</i> (tuber). Five teaspoons taken with a cup of warm water three times a day.
Modimolle	<i>Catharanthus roseus</i> (root) or <i>Hypoxis hemerocallidea</i> (tuber) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Mogalakwena	<i>Cotyledon orbiculata</i> (root) macerated in warm water for 24 hours. A cup of the decoction taken orally three times a day for a week. Or Combined roots of <i>Opuntia ficus-indica</i> and <i>Ziziphus mucronata</i> cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Mookgophong	<i>Catharanthus roseus</i> (root) cooked for 20 minutes. A cup of the extract taken orally three times a day for a week.
Thabazimbi	<i>Alternanthera pungens</i> tuber macerated in milk for 24 hours. A cup of the decoction taken orally three times a day for a week.

A cup = approximately 300 ml

Extracts are normally supplied in 2 L plastic bottles

Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

Discussion

Gonorrhoea and its diagnosis

The asymptomatic presentation of many bacterial STDs, including gonorrhoea is currently a major concern (Farley et al., 2003). Asymptomatic individuals do not consult medical practitioners for treatment, but can infect their partners, posing a major risk to the sexual health of individuals. Johnson et al. (2011) reported that symptomatic individuals (with urethral discharge, dysuria, and genital ulcers) seek treatment at a rate that is age and gender dependent. In the current study the only mentioned symptomatic presentation was urethral discharge; one can speculate that dysuria and genital ulcers, when present, were associated with other STDs and not necessarily with gonorrhoea. This is, to a certain extent, supported by an observation made by De Wet et al. (2011) who reported that lay people in northern Maputaland were familiar with the symptoms of STDs, without specifically knowing what infections they are treating.

Bapedi traditional healers acknowledge that risky sexual behaviour can contribute to being infected with an STD, in this case gonorrhoea (or "drop" as it is commonly referred to). This is evident from approximately 80% of the participating traditional healers asking their patients if they participated in unprotected sexual intercourse with multiple partners. Thirty seven percent of traditional healers agreed that unprotected sexual intercourse with an infected partner results in the spread of the disease. This is similar to the approach by medical practitioners, who ask questions about sexual behaviour to determine the relative risk profile based on patients' risky sexual behaviour.

Frequency of use of medicinal plants

Ethnobotanical surveys of sexually transmitted diseases in South Africa, especially gonorrhoea, are limited. De Wet et al. (2011) found that the Zulu of KwaZulu-Natal, used 33 plant species from 25 families to treat sexually transmitted or related infections. The current study differed slightly from theirs, in that the 18 species used by the Bapedi were used to treat what is considered to be gonorrhoea. *Catharanthus roseus* is used, although it contains poisonous alkaloids such as vincristine and vinblastine (Wink and Van Wyk, 2008), by 60% of traditional healers to treat gonorrhoea. It may be widely used due to its adaptability to numerous environmental conditions, easy introduction into home gardens as well as its weedy nature. The vernacular name "lepolomo le pinki la drop" alludes to the fact that among the Bapedi there is a distinct preference for plants with pink flowers. It is used to treat gonorrhoea, and no other ailments.

Aloe marlothii subsp. *marlothii* widespread use within the Capricorn district, and very limited utilization in Sekhukhune and Waterberg districts could possibly be attributed to its distribution. The current study recorded the use of *Aloe marlothii* subsp. *marlothii* in only four of the 15 participating municipalities; with only two of them using it to treat gonorrhoea.

Plant parts utilized and the mode of preparation

The existing literature supports the fact that every part of a plant has medicinal value (Gurib-Fakim, 2006; De Wet et al., 2010; Maroyi, 2011). It was therefore not surprising to observe that various plant parts are used, by Bapedi traditional healers to prepare extracts for the treatment of gonorrhoea. However, there was a distinct preference for plant parts located underground, such as roots, tubers and bulbs. It is reasonable to believe that this preference for underground parts stems from the limited seasonal availability of fruits and leaves (deciduous plants).

Catharanthus roseus plays an important role in the treatment of gonorrhoea, where the roots are used exclusively in the preparation of extracts. The roots are well known for their broad-spectrum antibiotic activity (Perez et al., 1990). This study found that Bapedi healers prefer prescribing roots to other plant parts. Possibly other plant parts did not resolve the symptoms of gonorrhoea and were subsequently, through years of experimentation eliminated as part of the treatment protocol.

Aloe marlothii subsp. *marlothii* roots were used (13.3%) by traditional healers from more centrally located regions (Capricorn and Sekhukhune). Using roots by the Bapedi contradicts earlier reports (Bisrat et al., 2000; Grace et al., 2008; York et al., 2011) which noted the extensive use of leaves to treat ailments. Preferring roots instead of leaves by the Bapedi, can at this stage not be explained as leaves of this succulent is always available.

Most traditional healers preferred to cook the plant parts for 20 minutes. However, exceptions were recorded from the Capricorn district; in Lepelle-Nkumpi and Polokwane municipalities *Catharanthus roseus* and *Callilepis salicifolia* were cooked for five minutes and in Blouberg municipality *Drimia elata* was cooked for 10 minutes.

Preparing medicine by macerating plant material requires 24 hours, this time consuming procedure may explain its limited use. Either water or milk can be used as the preparation medium. Water is always used hot whereas milk is used at room temperature. Using hot water warrants further investigation, however, room temperature milk is believed to have nutritional and cleansing properties as it assists digestive and renal functions.

Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

Administration of remedies

Oral administration was preferred as opposed to other applications. The fact that genital ulcers or lesions, unlike a smelly urethral discharge, were not considered during the diagnosis excludes the use of topical remedies. The consistency of an application of three times a day cannot be explained by means of literature. However, it is speculated that this consistency might be due to the resistive nature of the pathogen *Neisseria gonorrhoea*.

This study found a consistency of one cup measure as the norm. Even though this is considered an adult dose, and it is reasonable to speculate that all patients were adults. The current study does not reflect on the age of patients; however it cannot be excluded that some patients were sub adults. In this regard, Maroyi (2011) found in the Shona (Nhema area, Zimbabwe) that traditional healers varied their dosage according to age and physical condition. This study put forward that these consistencies (Bapedi and Shona) are based on cultural beliefs and perceptions regarding standardization and quality control. This is in contrast to Bekalo et al. (2009) who stated that a lack of standardization and quality control is one of the main disadvantages of traditional medicine.

Conclusion

The Bapedi used many plant species with reported antibacterial properties. Since gonorrhoea is a bacterial infection, Bapedi remedies should be effective to treat gonorrhoea. The seven day, three times a day, procedure followed by Bapedi traditional healers is similar to the prescription of antibiotics in current Western medical practice. Mealtime administration is reflected in both modern medicine and the use of traditional remedies.

References

1. Bekalo, T.H., Woodmatas, S.D., Woldemariam, Z.A. 2009. An ethnobotanical study of medicinal plants used by local people in the lowlands of Konta Special Woreda, southern nations, nationalities and peoples regional state, Ethiopia. *J. Ethnobiol. Ethnomed.* 5: 26. doi: 10.1186/1746-4269-5-26.
2. Bhat, R.B., Jacobs, T.V., 1995. Traditional herbal medicine in Transkei. *J. Ethnopharm.* 48: 7-12.
3. Bisrat, D., Dagne, E., Van Wyk, B.-E., Viljoen, A., 2000. Chromones and anthrones from *Aloe marlothii* and *Aloe rupestris*. *Phytochem.* 55: 949-952.
4. Corrigan, B.M., Van Wyk, B.-E., Geldenhuys, C.J., Jardine, J.M., 2011. Ethnobotanical plant uses in the KwaNibela Peninsula, St. Lucia, South Africa. *S.A. J. Bot.* 77: 346-359.
5. De Wet, H., Nkwananya, M.N., Van Vuuren, S.F., 2010. Medicinal plants used for the treatment of diarrhoea in northern Maputaland, KwaZulu-Natal Province, South Africa. *J. Ethnopharm.* 130: 284-289.
6. De Wet, H., Nzama, V.N., Van Vuuren, S.F., 2011. Medicinal plants used for the treatment of sexually transmitted infections by lay people in northern Maputaland, KwaZulu-Natal Province, South Africa. *S.A. J. Bot.* doi:10.1016/j.sajb.2011.04.002
7. Farley, T.A., Cohen, D.A. Elkins, W., 2003. Asymptomatic sexually transmitted diseases: the case for screening. *Prev. Med.* 36: 502-509.
8. Grace, O.M., Simmonds, M.S.J., Smith, G.F., Van Wyk, A.E., 2008. Therapeutic uses of *Aloe L.* (Asphodelaceae) in southern Africa. *J. Ethnopharm.* 119: 604-614.
9. Gurib-Fakim, A., 2006. Medicinal plants: Traditions of yesterday and drugs of tomorrow. *Mol. Asp. Med.* 27: 1-93.
10. Jäger, A.K., Hutchings, A., Van Staden, J., 1996. Screening of Zulu medicinal plants for prostaglandin-synthesis inhibitors. *J. Ethnopharm.* 52: 95-100.
11. Johnson, L.F., Dorrington, R.E., Bradshaw, D., Coetzee, D.J., 2011. The effect of syndromic management interventions on the prevalence of sexually transmitted infections in South Africa. *Sex. and Reprod. Healthcare* 2: 13-20.
12. Kambizi, L., Afolayan, A.J., 2001. An ethnobotanical study of plants used for the treatment of sexually transmitted diseases (njovhera) in Guruve District, Zimbabwe. *J. Ethnopharm.* 77: 5-9.
13. Kelmanson, J.E., Jäger, A.K., Van Staden, J., 2000. Zulu medicinal plants with antibacterial activity. *J. Ethnopharm.* 69: 241-246.
14. Lichtenstein, B., 2003. Stigma as a barrier to treatment of sexually transmitted infection in the American deep south: issues of race, gender and poverty. *Soc. Sc. and Med.* 57: 2435-2445.
15. Magee, A.R., Van Wyk, B.-E., Van Vuuren, S.F., 2007. Ethnobotany and antimicrobial activity of sieketroos (*Arctopus* species). *S.A.J. Bot.* 73: 159-162.
16. Mårdh, P.-A., 2004. How idespread are STDs? Need for improvement in surveillance systems, interpretation of test results and screening programs, as exemplified by genital chlamydial infection. *Rev. Gynaecol. Pract.* 4: 141-147.
17. Maroyi, A. 2011. An ethnobotanical survey of medicinal plants used by the people in Nhema communal area, Zimbabwe. *J. Ethnopharm.* 136: 347-354.
18. Mulaudzi, R.B., Ndhlala, A.R., Kulkarni, M.G., Finnie, J.F., Van Staden, J., 2011. Antimicrobial properties and

Publisher: African Networks on Ethnomedicines

Web page: /http://journals.sfu.ca/africanem/index.php/ajtcam/index

<http://dx.doi.org/10.4314/ajtcam.v9i4.17>

- phenolic contents of medicinal plants used by the Venda people for conditions related to venereal diseases. *J. Ethnopharm.* 135: 330-337.
19. O'Farrell, N., Hoosen, A.A., Coetzee, K.D., Van den Ende, J., 1991. Genital ulcer disease on women in Durban, South Africa. *Genitourin Med.* 67: 322-326.
 20. Perez, C., Pauli, M., Bazerque, P., 1990. An antibiotic assay by the agar-well diffusion method. *Acta Biol. Med. Exp.* 2: 708-712.
 21. Reid, K.A., Maes, J., Maes, A., Van Staden, J., De Kimpe, N., Mulholland, D.A., Verschaeve, L., 2006. Evaluation of the mutagenic and antimutagenic effects of South African plants. *J. Ethnopharm.* 106: 44-50.
 22. Sherrard, J., 2010. Gonorrhoea. *Medicine* 38: 245-248.
 23. Steenkamp, V., Fernandes, A.C., Van Rensburg, C.E.J., 2007. Antibacterial activity of Venda medicinal plants. *Fitoterapia* 78: 561-564.
 24. Van Vuuren, S.F., Naidoo, D., 2010. An antimicrobial investigation of plants used traditionally in southern Africa to treat sexually transmitted infections. *J. Ethnopharm.* 130: 552-558.
 25. Van Wyk, B.-E., Gericke, N., 2000. *People's Plants. A guide to useful plants of southern Africa*, 1st edn. Briza Publications.
 26. Van Wyk, B.-E., 2002. A review of ethnobotanical research in southern Africa. *S.A. J. Bot.* 68: 1-13.
 27. Wilkinson, D., Connolly, A., Harrison, A., Lurie, M., Abdool Karim, S.S., 1998. Sexually transmitted disease syndromes in rural South Africa: Results from health facility surveillance. *Sex. Transm. Dis.* 25: 20-23.
 28. Wink, M., Van Wyk, B.-E., 2008. *Mind-altering and poisonous plants of the world*. Briza Publications, Pretoria
 29. World Health Organization. 1991. *Management of patients with sexually transmitted diseases*. WHO Tech. Rep. Ser. 1-103.
 30. York, T., De Wet, H., Van Vuuren, S.F., 2011. Plants used for treating respiratory infections in rural Maputaland, KwaZulu-Natal, South Africa. *J. Ethnopharm.* 135: 696-710.