

Full Length Research Paper

## ***Catharanthus roseus* (L.) G. Don.: Extraordinary Bapedi medicinal herb for gonorrhoea**

S.S. Semanya\* and M. J. Potgieter

Department of Biodiversity, University of Limpopo, Private Bag X1106, Sovenga 0727, South Africa

Accepted 11 November, 2012

**The use of *Catharanthus roseus* by 30 Bapedi traditional healers to treat gonorrhoea in the Limpopo Province of South Africa, was investigated via a semi-structured questionnaire, supplemented with field observations. Results show that *C. roseus* is highly preferred by the majority (60%) of the interviewed healers, and that the pink form is exclusively used to treat gonorrhoea. This naturalised exotic species is actively being cultivated by healers in their home gardens for an easily available supply of material. The treatment of gonorrhoea by these healers using *C. roseus* was comparable in terms of the preparation method of the extract, including plant part (root) used and boiling time (20 min), as well as the administration procedure (oral prescription), dosage strength (300 ml three times per day) and treatment period (seven days). The current study concludes that *C. roseus* extracts might be effective against *Neisseria gonorrhoea*.**

**Key words:** Apocynaceae, Bapedi, traditional healer, *Catharanthus roseus*, ethnomedicine, gonorrhoea, Madagascar periwinkle.

### INTRODUCTION

For millennia, plants have been used both in preventive and curative medicinal therapies. Despite the availability of different approaches to drug discovery, plants still remain the main source of natural medicines for a variety of ailments such as sexually transmitted infections, including gonorrhoea (De Wet et al., 2011). Sexually transmitted infections (STIs) is a major public health concern in developing countries as it facilitates the transmission of human immunodeficiency virus. The prevalence of gonorrhoea is high in the sub-Saharan African countries such as Mozambique (Vuylsteke et al., 1993), Zimbabwe (Gomo et al., 1997), Botswana (Romeran et al., 2005) and Ethiopia (Hailemariam et al., 2013). Prevalence of this infection in the above mentioned sub-Saharan countries is of no difference in South Africa, and studies (Wilkinson et al., 1999; Kambizi and Afolayan, 2003) highlight this. According to Romeran et al. (2005), the spread of gonorrhoea in sub-Saharan

African countries is caused by many factors including unfaithfulness among sex partners, unprotected sexual contact and lack access to the modern treatment.

*Neisseria gonorrhoea*, the parasitic pathogen responsible for gonorrhoea (Paavonen, 2004), is primarily transmitted via vaginal, anal or oral sex, and there seems to be a more efficient transmission from males to females (Sherrard, 2010; Erasmus et al., 2012).

*Catharanthus roseus* (L.) G. Don., also known as Periwinkle, of the botanical family Apocynaceae, originated from Madagascar. For centuries, it has been cultivated as an ornamental throughout the tropics and occasionally in the subtropics due to its attractive pink, white or blue flowers. It has become naturalized in many regions, including South Africa. This popular and attractive garden perennial herb has become a weed in some parts of South Africa (Codd, 1963).

In South Africa, the species is widely used for various

\*Corresponding author. E-mail: Sebuasemanya@gmail.com.



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

medicinal purposes by different cultures. For instance, the Venda people use *C. roseus* to treat urogenital infections (Fernandes et al., 2008), while Zulu traditional healers use it to treat diabetes mellitus (Dauskardt, 1990), menorrhagia (Hutchings et al., 1996) and rheumatism (Marles and Farnsworth, 1995). In Southern and Eastern Africa, Watt and Breyer-Brandwijk (1962) reported its use by traditional healers to treat unspecified venereal diseases. In the Mutirikwi area of Zimbabwe, *C. roseus* is used to treat stomach ache (Chigora et al., 2007). In the Kancheepuram District of Tamil Nadu, India, traditional healers prescribe a decoction of this species to treat diabetes mellitus (Muthu et al., 2006).

As indicated earlier, gonorrhoea is a major public health concern in sub-Saharan African countries, including South Africa; this is also true for the rural Limpopo Province of South Africa. Thus, the current study set out to investigate the extent of use of *C. roseus* by Bapedi traditional healers in the treatment of gonorrhoea.

## METHODOLOGY

### Study area

The study was conducted in three districts (Capricorn, Sekhukhune and Waterberg) covering 15 local municipalities of the Limpopo Province of South Africa (Figure 1 and Table 1). These districts were selected due to their sizable population of Bapedi.

### Ethnobotanical information

A dual purpose reconnaissance survey was first carried out in each

local municipality to: (i) Obtain permission to conduct this study within the area of jurisdiction, and (ii) to meet with traditional healers to request their participation. In each of the 15 local municipalities, two traditional healers were randomly selected. Information was collected during first half of 2012 using a semi-structured questionnaire, followed up with open-ended conversations. Interviews were designed to gather data on plants used to treat gonorrhoea, the diagnoses of gonorrhoea, the extent of use of species to treat this infection, areas of collection, methods of extract preparation, and administration of medicine. Of all these, information related to *C. roseus* was mostly worth publishing.

### Collection of plant material

Plant material was collected from both home gardens and wild areas during guided tours by a healer. The species were initially identified by healers via vernacular names, with taxonomic identification taking place at the Larry Leach Herbarium of the University of Limpopo. Collection number of species were prepared and deposited at the mentioned herbarium.

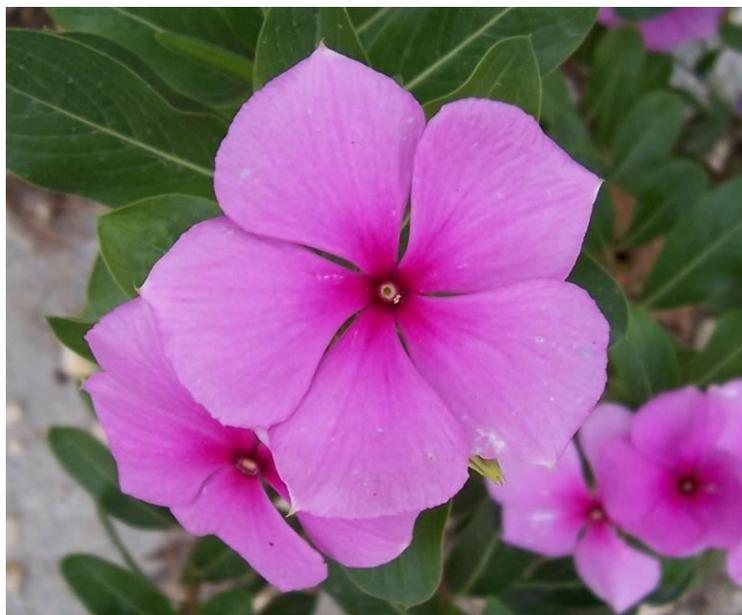
### Data analysis

Data were stored in Microsoft Excel 2007 programme and were later analysed for descriptive statistical patterns. Descriptive statistics, such as percentages and frequencies, have been used to analyse the data obtained from the questionnaire.

## RESULTS AND DISCUSSION

### Extent of use

Amongst 18 species used by Bapedi healers to treat gonorrhoea in the Limpopo Province, *C. roseus* is the species used most (60%). Other species were used less than 6% of the time by healers. Bapedi healers listed a



**Figure 2.** *C. roseus* (L.) G. Don. with pink flowers.

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

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

number of reasons for their preferences of this species. These include, the species adaptability to numerous environmental conditions, its easy introduction into home gardens (probably due to its weedy nature), and the perception that of all 18 species used to treat gonorrhoea, it is the most effective.

Hossan et al. (2010) noted that firstly if a species has been reported in different geographical areas to be used by many people, and secondly exclusively for the treatment of a particular ailment, then that species may in the future be a new source of medication for such illness. Thus, there is a high probability that this species, and in particular the pink form, might possess the active ingredients necessary to treat the *N. gonorrhoea* pathogen. Its 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 (Figure 2). This species is used to treat gonorrhoea, and no other ailment. It is interesting to note that healers in some municipalities such as Elias Motsoaledi, Marble Hall and Mookgophong (Table 2) relied exclusively on *C. roseus* to treat gonorrhoea. Semanya et al. (2012) noted that the

use of exotic species such as *C. roseus* by locals, could allow over used indigenous vegetation with similar utilizations to recuperate, thereby enhancing the regions’ biodiversity.

Not all questioned healers used *C. roseus* within the studied municipalities (Table 2). Healers residing in the Aganang and Blouberg municipalities did not use *C. roseus*; here, they used indigenous species to treat gonorrhoea. A similar finding was observed in the Makhuduthamaga as well as Lephalale, Mogalakwena and Thabazimbi municipalities. Traditional healers from these municipalities focused more on native species due to their greater familiarity with these species, their greater availability and consequently accessibility.

#### Source of *C. roseus*

It is worth noting that of all species used by Bapedi traditional healers to treat gonorrhoea, *C. roseus* was the only species which was cultivated in home gardens. This is not a unique geographical or tribe trait. In South Africa,

**Table 2.** The use of *Catharanthus roseus* (L.) G. Don. by Bapedi traditional healers to treat gonorrhoea.

| Districts  | Local municipalities | Plant part used | Single or multi extract | Alternative | Preparation       | Administration |
|------------|----------------------|-----------------|-------------------------|-------------|-------------------|----------------|
| Capricorn  | Lepelle-Nkumpi       | Root            | Single                  | Yes         | Boiled for 5 min  | Taken orally   |
|            | Molemole             | Root            | Single                  | Yes         | Boiled for 20 min | Taken orally   |
|            | Polokwane            | Root            | Single                  | Yes         | Boiled for 5 min  | Taken rectally |
| Sekhukhune | Elias Motsoaledi     | Root            | Single                  | No          | Boiled for 20 min | Taken orally   |
|            | Fetakgomo            | Root            | Single                  | Yes         | Boiled for 20 min | Taken orally   |
|            | Groblerdsdal         | Root            | Single                  | Yes         | Boiled for 20 min | Taken orally   |
|            | Marble Hall          | Root            | Single                  | No          | Boiled for 20 min | Taken orally   |
| Waterberg  | Modimolle            | Root            | Single                  | Yes         | Boiled for 20 min | Taken orally   |
|            | Mookgophong          | Root            | Single                  | No          | Boiled for 20 min | Taken orally   |

*C. roseus* occurred in more than 30% of home gardens in the Mbazwana village in KwaZulu-Natal (Nemudzudzanyi et al., 2010) and in more than 20% of Tswana home gardens in the Tlhakgameng and Ikageng villages in Northwest Province (Molebatsi et al., 2010). Bapedi traditional healers collected *C. roseus* from the wild and transplanted it in their home gardens. Healers noted that this transplantation is due to both the plants' medicinal value as well as its aesthetic value (due to its brightly-coloured flowers and evergreen nature). Its cultivation by Bapedi could in itself be seen as a conservation measure; as noted earlier, *C. roseus* might be a suitable candidate for optimising the utilization of indigenous species with similar medicinal uses.

### Treatment of gonorrhoea using *C. roseus*

The present study noted that roots of *C. roseus* are used exclusively in the preparation of extracts. Semanya (2012) noted that the medicinal preference of roots by Bapedi traditional healers for the treatment of STIs is based on the perception that more healing power is stored in this part. This claim is supported by a scientific study (Hamburger and Hotesttmann, 1991) which demonstrated that root contains more curative ingredients than any other plant parts. With the exclusion to traditional healers (13%) in the Capricorn district (Lepelle-Nkumpi and Polokwane municipalities), all healers (87%) preferred boiling *C. roseus* root extract for a period of 20 min (Table 2). The distinct preference of this boiling period is currently unknown and need to be investigated.

Similarly, the dominance (93%) of oral prescriptions of root extracts by healers warrants further investigation. However, sometimes especially with rectal administration (7%) via a bulb syringe, healers undertook the administration. Traditional healers who use this method mentioned that it is very dangerous and mostly used by

more experienced healers. They agreed that incorrect dosages (too much) can be fatal.

The results of this study further indicated that traditional healers orally prescribed one tin cup (300 ml) of the extract three times a day (for seven days) after meals or until symptoms of gonorrhoea disappears. Three times per day prescription is similar to that of antibiotics in current Western medical practice. Nevertheless, the high consistency amongst the Bapedi traditional healers regarding parts used, method of preparation, administration and dosage, would let one believe that traditional extract of *C. roseus* is standardised and effective.

### CONCLUSION

Although the literature indicates that *C. roseus* extracts have been used in the treatment of various diseases such as cancer, stomach ache, urogenital infections and diabetes mellitus, its exclusive use to treat gonorrhoea was unexpected, as no scientific evidence exist to support either its ethnobotanical use or efficacy as a treatment of gonorrhoea. Thus scientific investigations to validate *C. roseus* root efficacy against *N. gonorrhoea* is recommended. The fact that Bapedi traditional healers highly utilize it for gonorrhoea might provide a useful lead to the discovery of new affordable and readily available plant-based gonorrhoea treatment.

### ACKNOWLEDGEMENTS

The authors are grateful to the traditional healers in the study area for sharing their knowledge on herbal medicine

### REFERENCES

- Chigora P, Masocha R, Mutenheri F (2007). The role of indigenous medicinal knowledge (IMK) in the treatment of ailments in rural

- Zimbabwe: The case of Mutirikwi communal lands. *J. Sustain. Dev. Afr.* 9:1520–5509.
- Codd LE (1963). Apocynaceae. 7. *Catharanthus*. Flora of Southern Africa. Botanical Research Institute, Pretoria p 26.
- Dauskardt R (1990). The changing geography of traditional medicine, urban herbalism on the Witwatersrand, South Africa. *Geogr. J.* 22:257–283.
- De Wet H, Nzama VN, Van Vuuren SF (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.* 78:12–20.
- Erasmus LJC, Potgieter MJ, Semanya SS, Lennox SJ (2012). Phytomedicine versus gonorrhoea: The Bapedi experience. *Afr. J. Tradit. Complement. Altern. Med.* 9:591–598.
- Fernandes I, Van Rensburg CEJ, Hoosen AA, Steenkamp V (2008). *In vitro* activity of medicinal plants of the Venda region, South Africa, against *Trichomonas vaginalis*. *S. Afr. J. Epidemiol. Infect.* 23:26–28.
- Gomo E, Ndamba J, Nhandara C, Murahwa SZ, Nyazema NZ (1997). Prevalence of gonorrhoea and knowledge of sexually transmitted infections in a farming community in Zimbabwe. *Cent. Afr. J. Med.* 43:192–5.
- Hamburger H, Hostettmann K (1991). The link between phytochemistry and medicine. *Phytochemistry* 30:3864–3874.
- Hailemariam M, Abebe T, Mihret A, Lambiyo T (2013). Prevalence of *Neisseria gonorrhoea* and their antimicrobial susceptibility patterns among Symptomatic Women Attending Gynecology Outpatient Department in Hawassa Referral Hospital, Hawassa, Ethiopia. *Ethiop. J. Health. Sci.* 23:10–18.
- Hossan MS, Hanif A, Agarwala B, Sarwar MS, Karim M, Rahman MT, Jahan R, Rahmatullah M (2010). Traditional use of medicinal plants in Bangladesh to treat urinary tract infections and sexually transmitted diseases. *Ethnobot. Res. Appl.* 8:61–74.
- Hutchings A, Scott AH, Lewis G, Cunningham AB (1996). Zulu medicinal plants-An inventory. University of Natal Press, Pietermaritzburg.
- Kambizi L, Afolayan AJ (2003). Phytomedicinal studies of four selected medicinal plants used for the treatment of STIs in the Eastern Cape. *Fort Hare Papers* 12:10-24
- Marles RJ, Farnsworth NR (1995). Antidiabetic plants and their active constituents. *Phytomedicine* 2:137–189.
- Muthu C, Ayyanar M, Raja N, Ignacimuthu S (2006). Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.* 2:1–10.
- Paavonen J (2004). Sexually transmitted Chlamydia infections and sub fertility. *International Cong. Series* 1266:277–286.
- Semanya SS (2012). Bapedi phytomedicine and their treatment of sexually transmitted diseases in the Limpopo Province, South Africa. M.Sc. Dissertation, University of Limpopo, Mankweng.
- Semanya SS, Tshisikhawe MP, Potgieter MJ (2012). Invasive alien plant species: A case study of their use in the Thulamela Local Municipality, Limpopo Province, South Africa. *Sci. Res. Essays* 7:2363–2369.
- Sherrard J (2010). Gonorrhoea. *Med.* 38:245–248.
- Vuylsteke B, Bastos R, Barreto J, Crucitti T, Folgosa E, Mondlane J, Dusauchoit T, Piot P, Laga M (1993). High prevalence of sexually transmitted diseases in a rural area in Mozambique. *Genitourin. Med.* 69:427–30.
- Wilkinson D, Abdool-Karim SS, Harrison A, Lurie M, Colvin M, Connolly C, Sturm AW (1999). Unrecognized sexually transmitted infections in rural South African women: a hidden epidemic. *Bul. World Health Org.* 77:22–28.
- Watt JM, Breyer-Brandwijk MG (1962). *The Medicinal and Poisonous Plants of Southern and Eastern Africa*. Second Edition, Livingstone, London.