Abstract

The present study was aimed at documenting medicinal plants used for the treatment of tuberculosis (TB) by the Bapedi traditional healers in three districts of the Limpopo Province, South Africa. Fifty two traditional healers from 17 municipalities covering Capricorn, Sekhukhune and Waterberg districts were interviewed between January and July 2011. Twenty one medicinal plant species belonging to 20 genera and 18 families were documented. The majority (61.9%) are indigenous and the rest are exotics, found near homes as weeds or cultivated in home gardens as ornamentals or food plants. Hyacinthaceae, Moraceae and Rutaceae families were the most represented families in terms of species numbers (9.5% each). Herbs and trees (38% each) constituted the largest proportion of the growth forms of the medicinal plants used. Tuberculosis remedies were mostly prepared from leaves (34%) followed by roots (21%). The therapeutic claims made on medicinal plants used to treat TB by the Bapedi traditional healers are well supported by literature, with 71.4% of the species having antimicrobial properties or have similar ethno medicinal uses in other countries. This study therefore, illustrates the importance of medicinal plants in the treatment and management of TB in the Limpopo Province, South Africa.

Keywords: Bapedi traditional healers, ethnobotanical survey, Limpopo Province, South Africa, tuberculosis.
course, physical disability (either too sick or old) to collect treatment, clinic too far and drug not available in the clinic (Kandel et al., 2008). With the rapid increase in infection in sub Saharan Africa and due to the relatively high cost and limited access to synthetically derived drugs, communities in Africa have relied on traditional healers to treat infectious diseases (WHO, 2003). Traditional healers use medicinal plants as their primary source of medicine. Research done in Nigeria by Rinne (2001) revealed that local communities consult traditional healers on a regular basis because they are found within a short distance, are familiar with the patient’s culture and the environment and the costs associated with treatments are negligible. Rural patients are also more dependent on traditional or folk medicinal healers for treatment of infectious diseases for a number of reasons, such as lack of access to modern medical facilities and clinging to traditional approaches (Hossan et al., 2010). Despite the increasing acceptance of traditional medicine in treating TB in South Africa (Buwa and Afolayan, 2009; Green et al., 2010), this indigenous knowledge on traditional remedies is not adequately documented. Therefore, the present study investigated and documented the medicinal plants used by the Bapedi traditional healers in the treatment and management of TB in Capricorn, Sekhukhune and Waterberg districts of the Limpopo Province, South Africa.

Materials and methods
The study area

The present study was carried out in 17 local municipalities (Figure 1, Table 1), covering Capricorn, Sekhukhune and Waterberg districts. The majority of people in the study area belong to the Bapedi ethnic group, which is the largest group in the Limpopo Province of South Africa, comprising about 57% of the population (Lodge, 2005).

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

The study was undertaken between January and July 2011. A total of 52 traditional healers (36 males and 16 females) were purposefully selected with the help of local administrators and elderly people from 17 municipalities within three districts of the Limpopo Province (Table 1, Figure 1). At least two traditional healers per local municipality participated in personal interviews which were conducted in Sepedi language. Verbal informal consent was obtained from each individual traditional healer who participated in the study and researchers adhered to the ethical guidelines of the International Society of Ethnobiology (http://www.ethnobiology.net). The aim of the investigation was explained to all participants. Data on plant names, the plant part(s) used, diagnosis of TB, mode of medicinal plant usage and administration were documented. All plant species mentioned by the traditional healers as important in the treatment and management of TB were collected, numbered, pressed and dried for identification. Each specimen included important parts such as leaves, stems, flowers and fruits where available. For small herbaceous plants, the whole plants were collected. Specimens were deposited for future reference at the Larry-Leach Herbarium (UNIN), University of Limpopo.

Results

Medicinal plants used to treat TB

Table 2 gives a list of the plant species used by the Bapedi traditional healers in Capricorn, Sekhukhune and Waterberg districts in the Limpopo Province to treat TB. The survey documented 21 plant species belonging to 20 genera and 18 families (Table 2). Of these, 13 species are indigenous to the Limpopo Province (61.9%), while eight species are exotics (38.1%), either naturalized as weeds or cultivated in home gardens as ornamentals or food plants. Families Hyacinthaceae, Moraceae and Rutaceae are represented by two species each, while the rest of the families are represented by one species each, as shown in Table 2. Mentha sp. could not be identified to species level due to non-availability of flowers and fruits at the time of collection. The most regularly used plant species in the study area to treat TB were Artemisia afra, cited by 15.4% of the traditional healers; Eucomis pallidiflora ssp. pole-evansii and Myrothamnus flabellifolius (11.5% each), Lippia javanica (9.6%) and Hypoxis hemerocallidea (7.7%). The other plant species were used either by one or two traditional healers.

Table 2: Plant species used for the treatment of TB in Capricorn, Sekhukhune and Waterberg districts, Limpopo Province, South Africa. An asterisk (*) indicates that the taxon is known or believed to be exotic; and is cultivated in home gardens or naturalized in Limpopo Province, South Africa.

Leaves with crushed leaves of Mentha spp., wrapped in newspaper and smoked thrice a day

Cannabaceae
*Cannabis sativa L. SS24

Herb
Leaves

1

Leaves macerated in warm water for 24 hours and one cup of decoction taken orally thrice a day

Dry cough (Hutchings et al., 1996)

Cariesae
*Carica papaya L. SS70

Tree
Leaves

1

Leaves burned in a hut and smoke inhaled twice a day

TB (Green et al. 2010)

Combretaceae
Combretum hereroense Schinz. SS440

Shrub
Bark

1

Cooked for 20 minutes and one cup of extract taken orally thrice a day

Seeds

1

Seeds burned in a hut and smoke inhaled twice a day

Chest complaints and TB (Watt and Breyer-Brandwijk 1962)

Gentianaceae
Chironia baccifera L. SS22

Shrub
Roots

1

Cooked for 20 minutes and one cup of extract taken orally thrice a day

Diarrhoea and leprosy (Van Wyk and Gericke, 2000)

Hyacinthaceae
Eucomis pallidiflora Baker. ssp. pole-evansii (N.E.Br.) Reyneke SS355

Herb
Bulb

6

Cooked for 5-8 minutes and one cup of extract taken orally thrice a day

Chest complaints, mental-illness and STIs (Moeng 2010)

Constipation, diarrhoea and nausea (Hutchings et al., 1996)

Hypoxidaceae
Hypoxis hemerocallidea Fisch., C.A.Mey. & Ave-Lall. SS115

Herb
Tuber

1

Cooked for 5-20 minutes and one cup of extract is taken orally thrice a day

Arthritis, cold, flu, HIV/AIDS and wounds (Grierson and Afolayan, 1999)

Lamiaceae
Mentha spp. SS477

Herb
Leaves

1

Leaves wrapped and smoked twice a day

None found

Moraceae
*Ficus carica L. SS89

Tree
Bark

1

Cooked for 10 minutes and one cup of extract taken orally thrice a day

None found

*Ficus platypoda (Miq.) Miq. SS323

Tree
Roots

1

Cooked for 20 minutes and one cup of extract taken orally thrice a day

None found

Myrothamnaceae
Myrothamnus flabellifolius (Sond.) Welw. SS111

Shrub
Whole plant

1

Burned in hut and smoke inhaled four times a day

TB (Watt and Breyer-Brandwijk, 1962)

Myrtaceae
*Eucalyptus camaldulensis Dehnh. SS401

Tree
Leaves

1

Cooked for 5-20 minutes and one cup of extract taken orally thrice a day

Asthma, cough, diarrhoea and sore throat (Abubakar, 2010)

Pteridaceae
Pellaea calomelanos (Sw.) Link SS25

Fern
Roots

1

Cooked for 15 minutes and one cup of extract taken orally thrice a day

None found

Rosaceae
*Eriobotrya japonica Lindl. SS311

Tree
Roots

1

Cooked for 10 minutes and one cup of extract taken orally thrice a day

None found

Rutaceae
*Citrus lemon (L.) Burm. f. SS480

Tree
Leaves

1

Crushed leaves, wrapped in newspaper and smoked thrice a day

Cough, flu and fever (Maroyi, 2011)

Zanthoxylum capense (Thunb.) Harv. SS511

Tree
Roots

1

Burned in a hut and smoke inhaled twice a day

Cough, flu and fever (Bryant, 1966)

Salicaceae
Salix mucronata Thunb. SS77

Tree
Seeds

1

Six raw fruits taken orally thrice a day

Fever, rheumatism
Diagnosis

Bapedi traditional healers diagnosed TB based on patient’s signs and symptoms. Before starting the treatment, patients were observed carefully and asked about the signs and symptoms of TB (Table 3). The Bapedi traditional healers assess the treatment outcomes in patients, mainly by patient feedback and disappearance of TB signs and symptoms. Any patient who presented one or a combination of the signs and symptoms given in Table 3 was considered by the Bapedi traditional healers as TB “suspect”. Blood in the sputum was the most commonly cited diagnostic criterion, followed by a prolonged cough. After diagnosis, the healers prescribed and prepared the medication.

Table 3: Criteria used by the Bapedi traditional healers to diagnose TB

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
<th>No. of traditional healers*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood in the sputum</td>
<td>19</td>
</tr>
<tr>
<td>Prolonged cough</td>
<td>14</td>
</tr>
<tr>
<td>Weight loss</td>
<td>4</td>
</tr>
<tr>
<td>Swelled face and blood in the sputum</td>
<td>2</td>
</tr>
<tr>
<td>Chest pain and breathlessness</td>
<td>1</td>
</tr>
</tbody>
</table>

*Some traditional healers provided more than one diagnostic criterion

Growth forms, plant parts used and methods of application

An analysis of the medicinal species used by the Bapedi traditional healers to treat TB, revealed that herbs and trees constituted the largest proportion of growth forms with 38% each, followed by shrubs with 19% as shown in Figure 2A. Pteridophytes were represented by a single fern species, Pellaea calomelanos (Table 2). The plant parts used for herbal preparations were the roots, bulbs, tubers, leaves, bark, seeds, and fruits. The leaves were the most commonly used (34%), followed by roots (21%), whole plant (11%), bulbs and tubers (9% each), fruits (7%), bark and seeds with 4.5% each (Figure 2B). The whole plant was administered for herbaceous plant species. 28 TB remedies (96.6%) were prepared from single species (Table 2). However, crushed leaves and roots of Artemisia afra were mixed with crushed leaves of Mentha spp. and smoked thrice a day. Methods of herbal administration included oral, smoking and inhalation. Extracts or decoctions were prescribed orally with a metal cup (250 ml). The fruits of Salix mucronata were taken orally as raw thrice a day (Table 2). Traditional healers also burnt leaves of Artemisia afra, Carica papaya (leaves), Combretum hereroense (seeds), Myrothamnus flabellifolius (whole plant) and roots of Zanthoxylum capense in the consultation hut and patients inhaled the smoke twice to four times a day (Table 2). Leaves of Artemisia afra and Lippia javanica were deposited in a basin full of hot water and patients inhaled the resultant steam with their heads covered with a blanket. Crushed leaves of Artemisia afra, Citrus lemon and Mentha spp. were wrapped in a newspaper and smoked twice or thrice a day. All herbal preparations were taken for two weeks to a month depending on patient’s response to the medication, and individual healer’s experience with TB treatment and management.

Discussion

A large proportion of the plant species documented in this study have been validated through phytochemical and pharmaceutical research. Some, though not evaluated for their efficacy are used to treat TB and related diseases in South Africa and other parts of the world. For example Lippia javanica and Carica papaya are used by the VhaVenda traditional healers of the Limpopo Province, South Africa to treat TB (Green et al., 2010). Leaves of Lippia javanica are used extensively in southern Africa to treat respiratory complaints (Watt and Breyer-Brandwijk, 1962). Likewise, Cannabis sativa leaves are smoked by Zulu people to treat dry cough (Hutchings et al., 1996), while the root of Zanthoxylum capense is a remedy for chronic coughs (Bryant, 1966). Similarly, Aframomum melegueta is documented as a remedy for tuberculosis,
cough and chest congestion in Cameroon (Betti, 2004) and Nigeria (Gill, 1992). Eldeen and Van Staden (2007) documented anti-bacterial activity of *Salix mucronata*. Leaf extract of *Eucalyptus camaldulensis* inhibited the growth of *Bacillus cereus*, *Escherichia coli*, *Klebsiella pneumonia* and *Staphylococcus aureus* (Abubakar, 2010). *Combretum hereroense* is reported as a remedy for TB and chest complaints in southern and eastern Africa (Watt and Breyer-Brandwijk, 1962). Extracts from this species have shown some activity against *Bacillus cereus*, *Escherichia coli*, *Klebsiella pneumonia* and *Staphylococcus aureus* (Alexander et al., 1992). To the best of our knowledge *Eriobotrya japonica* and *Merwilla plumbea* are reported in this study for the first time as remedies for TB in South Africa; but they are widely used to treat an array of other ailments including boils, impotency, infertility, sores and wounds (Van Wyk et al., 2009). Furthermore, the use of *Eriobotrya japonica* by the Bapedi traditional healers as a TB remedy is consistent with its application in Chinese ethnomedicine (Parhar et al., 2011). The people of Muroto and Susaki cities in Japan (Nishioka et al., 2002) and traditional healers in Korea (Ito et al., 2000), use this species as a remedy for cough, an ailment either directly or indirectly associated with TB (Zaman et al., 2006). Although no known reports exist for *Eriobotrya japonica* as a TB remedy in South Africa, its bulb extract demonstrated anti-bacterial activity against *Staphylococcus aureus* (Verschaeve and Van Staden, 2008).

The wide utilization of *Artemisia afra* by the Bapedi traditional healers in this study to treat TB is in partial agreement with findings of Van Wyk and Gericke (2000), who noted its use as a remedy for respiratory disorders (asthma, bronchitis, colds, coughs and whooping cough). Leaf extract of *Artemisia afra* has been reported by Buwa and Afolayan (2009) as active against *Bacillus cereus*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, and *Mycobacterium A*+ strain. No anti-bacterial activity has been documented so far for *Eucomis pallidiflora* ssp. *pole-evansii*, a widely used TB remedy in the Limpopo Province. But anti-bacterial activity against *Staphylococcus aureus* have been demonstrated by two closely related *Eucomis comosa* and *Eucomis humilis* (Du Toit et al., 2005). A study by Grierson and Afolayan (1999) noted wide use of *Hypoxis hemerocallidea* by Xhosa healers to treat wounds and alleviate arthritis, cold, flu and HIV/AIDS. According to Lall and Meyer (2001), individuals infected with HIV/AIDS are also susceptible to TB and often develop this disease before other manifestations become apparent. Pharmacological activities of *Hypoxis hemerocallidea* extracts have been documented by Nicoletti et al. (1992), Mills et al. (2005), Ojewole (2006) and Muwanga (2006). The uses of *Myrothamnus flabellifolius* as a TB remedy and other related ailments are well documented in South Africa (Watt and Breyer-Brandwijk, 1962; Mabogo, 1990; Hutchings et al., 1996) and Zimbabwe (Gelfland et al., 1985).

**Conclusion**

This study shows that local communities in the Limpopo Province are still dependant on traditional medicines to treat and manage TB. The documented medicinal plants used by the Bapedi traditional healers reflect a rich ethno medicinal knowledge in the province. These results strengthen the firm belief that traditional medicines are readily accessible and still play an important role in meeting the basic health care of many people in developing countries. Some of the medicinal plants documented in this study can provide a treatment option that is readily accessible and affordable to TB patients in the Limpopo Province, the rest of South Africa and also beyond the national boundaries. The literature search has also shown that a large proportion of medicinal plants prescribed to TB patients by the Bapedi traditional healers are effective against several infectious pathogens. This is an indication of the potential value of the documented medicinal plants as sources of compounds needed for the development of plant derived anti-tuberculosis drugs.
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References


