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AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED IN VILLAGES UNDER JONGILANGA TRIBAL COUNCIL, MPUMALANGA, SOUTH AFRICA

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Abstract

Background: Medicinal plants remain an integral part of the lives of people in rural areas. The aim of this study was to document information about the medicinal plants used by Shangaan people in villages under Jongilanga tribal council, Bushveldridge municipality, Mpumalanga Province, South Africa.

Materials and Methods: An ethno-botanical survey of medicinal plants was conducted using a semi-structured questionnaire with 15 traditional healers as informants; one of them also served as a field guide during data collection. Results were analysed by using various quantitative indices of information consensus factor (ICF), use report (UR), frequency citation (FC) and relative frequency citation (RFC).

Results and Methods: The study reported 86 medicinal plants used in villages for the treatment of various ailments, the majority (25 species) of which were used for urino-genital disorders. The Fabaceae family was the most represented family (17 species) of all the medicinal plants recorded in this study. The roots were the most frequently used plant part, accounting for 56% of the plants reported, and decoctions were often used in the preparation of herbal remedies. Respiratory diseases had the highest ICF value recorded among the 8 categories of ailments. The highest use report was reported for Combretum collinum (4), while the FC and RFC values (15) were highest in 12 plant species. The study revealed that medicinal plants are still widely used in rural areas and this documentation can serve as an ethno pharmacological basis for selecting plants with potential pharmaceutical properties.

Keywords: Medicinal plants, Traditional healers, Jongilanga

Introduction

With over hundreds of years in existence, traditional medicine is still widely used, Africa. Many countries have made great efforts to recognize traditional medicine as a health system which plays an important role especially in poor households (Abdullahi, 2011). Traditional medicine is sometimes the only easily accessible and affordable treatment available in many rural areas in developing countries. There is a long history of medicinal plant use on the African continent and in some countries up to 90% of the population rely on medicinal plants as a source of therapeutics (Glenn and Bussmann, 2010; Simbo, 2010; Mesfin et al., 2009).

Traditional medicine knowledge is diminishing in many rural communities. Therefore, its documentation is of paramount importance and urgent so that it can be preserved and conserved (Maroyi, 2012). Traditional knowledge is passed from generation to generation without the aid of any documentation or keeping written records. This knowledge will be lost with succeeding generations if it is not rapidly researched and recorded (Simbo., 2010). Ethnobotanical surveys are effective methods in documenting and identifying medicinal plants used in traditional knowledge system (Mahwasane et al., 2013). The purpose of this study was to document information about medicinal plants’ used in villages under Jongilanga tribal council, Mpumalanga province, South Africa. According to the authors’ knowledge, this study will present the first proper documentation of medicinal plants in this area.

Material and Methods

Study area

Mpumalanga is one of the nine South African provinces within the Maputaland-Pondoland region, harbouring the southern half of the Kruger National Park and other centres of endemism. Mpumalanga is divided into three districts, namely the Gert Sibande district, Nkangala district and Ehlanzeni district. The Ehlanzeni district municipality is located in the north-eastern part of Mpumalanga Province bordered by Mozambique and Swaziland. The Ehlanzeni district municipality covers an area of 27 895.47 km². Thus, the district is divided into the local municipalities Mbombela, Nkomazi, Bushveldridge, Umjindi, and Thaba Chweu (Figure 1). The Bushveldridge local municipality covers an area of 2 589.59 km² with Dwarsloop, Thulamahashe, Maviljan, Shatatse, Mkuhulu and Marite being the main townships. The rest of the geographical area in Bushveldridge is made up of villages (Mpumalanga provincial government, 2011). The dominant languages in Mpumalanga include Siswati (30%), a language from the neighbouring country, Swaziland; while 26% of the inhabitants speak isiZulu, 10.3% isiNdebele, 210.2% Northern Sotho and 11.6% Xitsonga.

The Jongilanga tribal council (GPS coordinates: S 24° 53’ 35.52”) falls under Bushveldridge local municipality and controls about 14 villages (Agincourt, Belfast, Croquet Lawn, Cork, Cunningmoor, Dumphries, Huntingdon, Justicia, Kildare, Lillydale, Ronaldsey, Oakley and Somerset) where this study was conducted. Most people in these villages speak Xitsonga, but they can also speak other provincial languages (www.bushveldridge.gov.za).
Figure 1: Map of Mpumalanga showing location of the study area (circled).

Ethnobotanical data collection

This study focused on indigenous medicinal plants used by traditional healers in villages that fall under the Jongilanga tribal council. All legal aspects of the study were adhered to before data collection. The investigation was carried out using questionnaires designed to facilitate semi-structured face-to-face interviews with traditional healers. The objectives of the study were explained before seeking their consent to engage in these interviews. This interaction was directed at recording information on medicinal plants used locally, local names of plants, plant parts used to treat various ailments, medicinal uses and preparation methods. Fifteen traditional healers were interviewed during six field visits between April 2011 and April 2013. Mr. Mahore, a traditional healer from one of the villages within the Jongilanga traditional council, was also used as a guide during field trips to collect plant material.

Voucher specimens of collected medicinal plants were prepared in the field and identified at the H.G.W.J. Schwelcherdt herbarium (PRU), University of Pretoria. Some of the plant species were taken to the South African National Biodiversity Institute.
Table 1: Medicinal plant uses

| Scientific and family name | Local name | Voucher number | Plant part | Preparation | Medicinal uses | U | R | F | C | RF |
|----------------------------|------------|----------------|------------|-------------|----------------|---|---|---|---|----|
| Abrus precatorius L. Fabaceae | Matihlo ya baloyi | Mophutin g 119334 | Whole plant | Decoc tion | Kidney problems Blood in urine | 2 | 6 | 0.40 |
| Abutilon fruticosum Malvaceae | Nkaya | Mophutin g 117176 | St em | Infusion | Diarrhoea | 1 | 11 | 0.70 |
| Acacia nilotica Fabaceae | Mugamazu | Mophutin g 117174 | Roots | Decoc tion | Mental illnesses Headaches Wounds | 3 | 10 | 0.70 |
| Acacia karoo Fabaceae | Rizaza | Mophutin g 119360 | Roots | Decoc tion | Sexually transmitted infections | 3 | 8 | 0.50 |
| Albizia harveyi Fabaceae | Ndzo'olwane | Mophutin g 117161 | Roots | Decoc tion | Rituals Cleansing ceremony | 1 | 7 | 0.47 |
| Alectra sessiliflora Scrophulariaceae | Ndliwa | Mophutin g 119340 | Roots | Whole plant | Decoc tion | Kidney problems | 1 | 6 | 0.40 |
| Agathisanthemum bojeri Rubiaceae | Mavunge | Mophutin g 119330 | Roots | Decoc tion | Swollen testicles | 1 | 4 | 0.27 |
| Aloe marlothii Liliaceae | Mhangane | Mophutin g 117180 | Stem | Burn | Eyes High blood pressure | 2 | 15 | 1.00 |
| Antidesma venosum Euphorbiaceae | Ntsongwe | Mophutin g 117167 | Roots | Decoc tion | Fertility in women | 2 | 10 | 0.67 |
| Asparagus edulis Asparagaceae | Nkwangula/tilo | Mophutin g 119329 | Whole plant | Decoc tion | Sores Itching skin | 2 | 8 | 0.53 |
| Asparagus exuvialis Asparagaceae | Nkwangulatilowuntsongo | Mophutin g 119347 | Roots | Decoc tion | Back pains Fatigue | 2 | 9 | 0.60 |
| Boophone disticha Amaryllidaceae | Riheman | BC54 | Bulb | Decoc tion | Truth serum Bad luck | 2 | 10 | 0.67 |
| Carissa edulis Apocynaceae | Xivambula/numnum | Mophutin g 119351 | Roots | Infusion | Vomiting blood Ear problems | 2 | 12 | 0.80 |
| Catunaregam sp. A Poaceae | Xirimbe | Mophutin g 119345 | Fruit | Infusion | Induces vomiting laxative | 2 | 13 | 0.87 |
| Catunaregam spp. Rubiaceae | Xirhuki | Mophutin g 117170 | Fruits | Fruit | Induces vomiting Traditional healer training | 1 | 7 | 0.47 |
| Chamaecrista capensis Fabaceae | Mahlakule | Mophutin g 119343 | Roots | Decoc tion | Witchcraft | 2 | 15 | 1.00 |
| Crotalaria aqutiflora Fabaceae | Mahlampyana | Mophutin g 119344 | Roots | Infusion | Laxative | 1 | 5 | 0.33 |
| Cordia ovalis Boraginaceae | Mpungwana Xinyanyam | Mophutin g 117159 | Bark of the stem | infusion | Good luck | 1 | 14 | 0.93 |
| Combretum imberbe Combretaceae | Mondzo | Mophutin g 117175 | Roots or stem | Infusion | Menstruation | 1 | 10 | 0.67 |
| Combretum collinum Combretaceae | Fufu | Mophutin g 117156 | Roots | Infusion | Painful legs Cramps Joint pains | 4 | 10 | 0.67 |
| Combretum apiculatum Combretaceae | Xihlabalavhana | Mophutin g 119358 | Whole plant | Decoc tion | Mouth colouring | 1 | 3 | 0.20 |
| Crabbea hirsuta Acanthaceae | Xitsayitsayi | Mophutin g 119366 | Roots | Infusion | Eye problems | 1 | 8 | 0.53 |
| Crotalaria cf. burkeana Fabaceae | Phuphama | Mophutin g 117184 | Roots | Mix with lotion | Love charm Good luck | 2 | 10 | 0.67 |
| Family     | Common Name | Scientific Name     | Parts Used | Traditional Uses                                                                 |
|------------|-------------|---------------------|------------|----------------------------------------------------------------------------------|
| Fabaceae   |             |                     |            |                                                                                  |
| Dalbergia  |             | Dalbergia melanoxylon | Roots      | Antispasmodics, high blood pressure                                              |
| Oleaceae   |             | Oleaceae            | Decoction  |                                                                                  |
| Fabaceae   |             |                     | Infusion   |                                                                                  |
| Dichrocarpus |           |                     |            |                                                                                  |
| Fabaceae   |             |                     |            |                                                                                  |
| Diospyros  |             |                     |            |                                                                                  |
| Fabaceae   |             |                     |            |                                                                                  |
| Drimia sp  |             |                     |            |                                                                                  |
| Hyacinthaceae |         |                     |            |                                                                                  |
| Elaeocarpus |             |                     |            |                                                                                  |
| Fabaceae   |             |                     |            |                                                                                  |
| Euclea crispa |           |                     |            |                                                                                  |
| Ebenaceae  |             |                     |            |                                                                                  |
| Euclea natalensis |       |                     |            |                                                                                  |
| Fabaceae   |             |                     |            |                                                                                  |
| Fauxa saligna |           |                     |            |                                                                                  |
| Proteaceae |             |                     |            |                                                                                  |
| Ficus burkei |           |                     |            |                                                                                  |
| Moraceae   |             |                     |            |                                                                                  |
| Gazania    |             |                     |            |                                                                                  |
| Ebenaceae  |             |                     |            |                                                                                  |
| Grewia     |             |                     |            |                                                                                  |
| Asteraceae |             |                     |            |                                                                                  |
| Gymnosporia |             |                     |            |                                                                                  |
| Ixectraceae |             |                     |            |                                                                                  |
| Helichrysum|             |                     |            |                                                                                  |
| Asteraceae |             |                     |            |                                                                                  |
| Hernia sp  |             |                     |            |                                                                                  |
| Hyposis    |             |                     |            |                                                                                  |
| Hyposidaceae |         |                     |            |                                                                                  |
| Indigofera sp |         |                     |            |                                                                                  |
| Fabaceae   |             |                     |            |                                                                                  |
| Ipomoea    |             |                     |            |                                                                                  |
| Convolvulaceae |       |                     |            |                                                                                  |
| Jasminium  |             |                     |            |                                                                                  |
| Oleaceae   |             |                     |            |                                                                                  |
| Jasminium  |             |                     |            |                                                                                  |
| Oleaceae   |             |                     |            |                                                                                  |
| Oleaceae   |             |                     |            |                                                                                  |

**Notes:**
- **Parts Used:** Roots, Decoction, Infusion, Whole plant.
- **Traditional Uses:** Antispasmodics, high blood pressure, Fire burns, Head sores, Magical, STD’s, STI.
- **Risks:** Tapers tapeworms, Induces vomiting, Head sores, Magical, Head sores, Magical.
- **Dosages:** 1 g 117157, 1 g 119332, 1 g 119336, 1 g 117138, 1 g 119369, 1 g 119353, 1 g 117181, 1 g 117182, 1 g 119336, 1 g 117138, 1 g 119353.
| Plant Name                        | Common Name                                                                 | Family            | Part Used   | Preparation                | Uses                                                                 | MZ  | LZ  | ZO  |
|----------------------------------|------------------------------------------------------------------------------|-------------------|-------------|---------------------------|----------------------------------------------------------------------|-----|-----|-----|
| Jatropha zeyleyi                 | Mfeo                                                                         | Euphorbiaceae     | Bulb        | Chew                      | Miscarriages, Testicle sores                                          | 3   | 5   | 0.33|
| Kalancheae thyrsiflora           | Xinyanyo                                                                    | Crassulaceae      | Whole plant | Mix with lotion            | Love charm                                                            | 1   | 9   | 0.60|
| Lagerra crispata Asteraceae      | Xikhwaxa                                                                    | Asteraceae        | Roots       | Decoction                 | Swollen stomach                                                      | 1   | 3   | 0.87|
| Lannea schweinfurthii var. stuhl | Ximbombokanyi                                                               | Asclepiadaceae    | Roots       | Decoction                 | Body aches                                                           | 1   | 7   | 0.47|
| Lippia Javanica                  | Umsuzwane                                                                   | Verbenaceae       | Roots       | Decoction                 | Respiratory problems, Chest pains, Herbal tea                        | 3   | 15  | 1   |
| Macrotiya maranguense            | Xikondlo                                                                    | Fabaceae          | Bulb        | Chew                      | Swollen or painful testicles                                        | 1   | 7   | 0.47|
| Mundulea sericea Fabaceae        | Vatanyayini                                                                 | Fabaceae          | Roots       | Add to bath water         | Relieves nervous tension                                             | 1   | 15  | 1   |
| Ochna natalitia                  | Mahlanganisi lama kulu                                                     | Ochnaceae         | Roots       | Decoction                 | Painful joints                                                       | 1   | 3   | 0.87|
| Othonacarpum trichocarpum        | Xiritane                                                                    | Fabaceae          | Inner bark of roots | Infusion                 | Erectile dysfunction                                                 | 2   | 15  | 1   |
| Opuntia ficus-indica             | Xitokorofiya                                                               | Cactaceae         | Stem        | Decoction                 | High blood pressure                                                  | 1   | 7   | 0.47|
| Ozoroa sphaerocarpa               | Xinungu                                                                     | Anarcardiaceae    | Whole plant | Decoction                 | Induces lactation, Wounds                                            | 2   | 11  | 0.73|
| Pappea capensis Sapindaceae       | Xinungu                                                                     | Sapindaceae       | Bark        | Decoction                 | Penis enlargement, Reduction of breasts in men, Painful feet         | 3   | 4   | 0.27|
| Pavetta cf. gracilifolia         | Ncolovoti                                                                   | Rubiaceae         | Roots       | Decoction                 | Heartburn, Stomach problems, Induces vomiting                       | 2   | 7   | 0.47|
| Pterocarpus angolensis Fabaceae   | Mrhotso                                                                     | Fabaceae          | Roots       | Decoction                 | Fertility in cows, Induces vomiting                                 | 1   | 3   | 0.87|
| Pterocarpus rotundifolius Fabaceae| Nxelele                                                                     | Fabaceae          | Roots       | Grind and add to the kraal water | Erection enhancer                                                  | 2   | 15  | 1   |
| Peltophorum africanum Rosaceae    | Nhlanhlanhu                                                                 | Rosaceae          | Roots       | Decoction                 | Body pain                                                            | 1   | 1   | 0.00|
| Phllotisma thonningii Fabaceae    | Nkholonkholho                                                               | Fabaceae          | Roots and leaves | Decoction                 | Bone aches, Erection enhancer                                       | 2   | 15  | 1   |
| Philenoptera violacea Fabaceae    | Mbhandzu/Apple leaf                                                         | Fabaceae          | Roots       | Infusion                  | Induces vomiting, Good luck                                          | 2   | 9   | 0.60|
| Physilanthus reticulatus          | Xincimba, Potato bush                                                       | Euphorbiaceae     | Roots       | Decoction                 | Blood problems                                                       | 1   | 7   | 0.47|
| Rhoeicissus tridentata Vitaceae   | Mbhezane leyi kulu                                                          | Vitaceae          | Roots       | Decoction                 | STI                                                                  | 1   | 1   | 0.40|
| Raphionacme procumbens Aselepiadaceae | Dema                         | Fabaceae          | Bulb        | Mix with milk              | Painful waist, Enhances erection                                     | 2   | 4   | 0.27|
| Senna italica spp. Avachoideae    | N’warimanga na                                                              | Fabaceae          | Roots       | Decoction                 | STI                                                                  | 1   | 15  | 1   |
| Schonitia branchyptetala Fabaceae | Mvhomvhom vho                                                               | Fabaceae          | Roots Seeds | Decoction                 | Shoulder pains, Sternum pains                                       | 2   | 4   | 0.27|
| Sida Rhombifolia                 | Tihoveta                                                                    | Fabaceae          | Whole plant | Grind and                 | Anti-dandruff                                                        | 1   | 6   | 0.40|
The number of plants used per ailment category. Various qualitative indices, including the informant consensus (ICF), use report (UR), and relative frequency of citation (RFC), were applied. The informant consensus factor (ICF) for different ailment categories was calculated with the following formula, as cited in the literature (Yaseen et al., 2015). The Frequency citation (FC) is the number of informants reporting the use of the species and the relative frequency (RFC) was calculated using the following formula: RFC = FC/N. This index is obtained by dividing the FC (number of informants reporting the use of the species) by the total number of plant species used to treat that particular category by informants.

Data analysis

The data were entered into Microsoft Excel sheets for analysis and identifying various proportions, such as plant parts used, plant families and the number of plants used per ailment category. Various qualitative indices, including the informant consensus (ICF), use report (UR), and relative frequency of citation (RFC), were applied. The informant consensus factor (ICF) for different ailment categories was calculated with the following formula, as cited in the literature (Yaseen et al., 2015). The Frequency citation (FC) is the number of informants reporting the use of the species and the relative frequency (RFC) was calculated using the following formula: RFC = FC/N. This index is obtained by dividing the FC (number of informants reporting the use of the species) by the total number of plant species used to treat that particular category by informants.

Results and discussion

The ages of respondents (Traditional healers) interviewed ranged from 40 to 90 years old and majority of them were female (82%). During the survey, a total of 82 plant species covering 77 genera and 42 families were recorded, collected and identified. Table 1 presents the ethnobotanical inventory with detailed information (local names, family names, parts used, preparation method, medicinal uses, and use report, frequency citation (FC) and relative frequency citation (RFC). The highest use report was reported for Combretum collinum (4), while the FC and RFC values (15) were highest in 12 plants.
The results of this study showed that most plants documented are used in the ailment category of urino-genital disorder (25 species), followed by gastro-intestinal disorders, skeleto-muscular pain and swelling (eight species), other ailments (eight species) and ear, eye and oral problems (six species). Dermatological disorders, cosmetics, high blood pressure and respiratory diseases all had four plant species each. Moreover, a single plant is used for more than one ailment, for example, *Acacia nilotica* (mental illnesses, headaches, and wounds), *Ipomoea oblongata* (asthma and high blood pressure), and *Lippia javanica* (chest pains and herbal tea).

**Figure 2**: Number of plant species used per ailment category

The most frequently represented families were Fabaceae (19 species), followed by Combretaceae, Ebenaceae, and Asteraceae (three species each). The rest of the families were represented by either one or two species each. The family fabaceae is characterized by a large number of traits. Most of the taxa of this family are herbaceous, sometimes shrubby and are very rarely trees. This family is also characterized by an impressive phytochemical diversity. Flavonoids and tannins are the most common polyphenols found in the family, but for a pharmaceutical perspective the various types of alkaloids found are the most interesting and pharmaceutically relevant (Van Wyk & Van Wyk, 1997; Heinrich et al., 2004). The reported medicinal plants are used in the treatment of various ailments categorised in Table 2, which also shows the informant consensus factor. In recent ethnobotanical studies, consensus analysis has been used in order to measure the reliability of the data given by different informants (Tabuti et al., 2012; Kumar et al., 2012; Garcia et al., 2010).

The highest ICF value (1) was recorded for respiratory diseases category. The other ailment categories ICF ranges from 0.50 to 0.84, with an average value of 0.79. Plant species are used by the local inhabitants for the treatment of various ailments. These ailments were grouped in to eight categories based on indigenous classifications developed by medical practitioners. However medicinal uses such as rituals, love charm, witchcraft, and mental disorders did not match with the classes of broad diseases and these were placed in a separate category (other).

Table 2: Number of plants used for different ailment categories

| Ailment categories                        | Biomedical terms                                              | ICF or $F_{ci}$ |
|------------------------------------------|--------------------------------------------------------------|-----------------|
| Urino-genital disorders                  | Kidneys, sexually transmitted diseases, infertility, menstrual disorders, erectile dysfunction | 0.84            |
| Dermatological disorders and cosmetics   | Skin problems, wounds, burns, anti-dandruff                  | 0.75            |
| Ear, eye, oral problems                  | Ear, eye and oral problems                                   | 0.84            |
| Gastro-intestinal disorders              | Vomiting, stomach ache, diarrhoea, laxatives and worms        | 0.78            |
| Respiratory diseases                     | Chest pains, asthma,                                         | 1.00            |
| Skeleto-muscular pain and swelling       | Body aches, muscular pains, headache, joint pains, swelling  | 0.86            |
| High blood pressure                      | Rituals, love charm, witchcraft, mental disorders             | 0.76            |
| Other                                    |                                                              | 0.50            |

$F_{ci}$ = Factor of informants consensus
This study found that different parts (roots, leaves, seeds, fruit, etc.) of medicinal plants are used by traditional healers to prepare herbal remedies. Figure 3 shows that, among these plant parts used, roots (56%) are the most frequently used, followed by stems (9%), whole plants (9), fruits (4%) and other (3%). Similarly, in studies conducted in many other African countries, roots were indicated to be the most used plant part and infusion and decoction are the most common preparation methods that are used by traditional healers with water often used as a solvent system (Ahmad et al., 2014.).

Figure 3: Plant part used as medicine

It is therefore, important to save the traditional knowledge through conservation and scientific investigations of plant species collected. In this context, more detailed studies about the use of medicinal plants by the Jongilanga communities are currently carried out by our research group, and the biological activities of the plant species used in the treatment of ureno-genital disorders are being evaluated.

Conclusion

Our ethno-botanical survey documents an important ethnobotanical knowledge on the medicinal plants that are widely been used by Shangaan people in villages under the Jongilanga tribal council. Forty-two families consisting of 82 species were found to be used for medicinal purposes in these communities. These plants treated conditions such as malaria, tuberculosis, and sexually transmitted diseases. Roots are the mostly harvested plant part; however there is a need to educate traditional healers about the danger of over-exploitation of these medicinal plants for future use.

Among the plant species reported, some could be of real potential to improve human life if studied further. Screenings in various bioassays of selected plants from this study are under way in order to ascertain their biological effectiveness and toxicity. Majority of the medicinal plants recorded in this study have a least concern status according to South African National Biodiversity Institute (SANBI) red list of 2015. Cultural conservation practices are still in place in these communities, however there is still a need to educate community members about sustainable use of plants. Future research on ecological and cultural conservation efforts are needed for the sustainable use of medicinal plants.

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