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A SURVEY OF MEDICINAL PLANTS USED IN THE TREATMENT OF DYSENTERY IN AMATHOLE DISTRICT MUNICIPALITY, SOUTH AFRICA

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Abstract

In view of the prevalence of dysentery in developing countries such as South Africa and the erosion of indigenous knowledge of phytomedicine due to lack of interest by the young generation, a survey of five local municipalities of Amathole district, Eastern Cape Province was carried out in 2012. A questionnaire-guided interview of the indigenous people by random sampling was done with the help of an interpreter during a survey of the district. Fifty-five (55) respondents participated in the study. The respondents comprised of 25% traditional medical practitioners, 15% herb-sellers and 15% rural elders. Fifty-one (51) plants species of 32 families were documented. Fabaceae had the highest representation of seven (14%) plant species used for the treatment of dysentery; some other families were Asphodelaceae, Apiaceae, Geraniaceae, Anacardiaceae, Bignoniaceae, Ebenaceae, Euphorbiaceae, Hyacinthaceae, Asclepiadiaceae, Acanthaceae, Asteraceae, Balanophaceae, Celstraceae, Convolvulaceae, Cornaceae, Iridaceae, and Hydronaceae. The medicinal plants with the highest frequency of prescription were *Hydnora africana* and *Alepidea amatymbica*. The plants were used singly or in combination in recipes. Leaves (28%) had the highest use-value of plant parts, followed by the roots (24%), bark (22%) and the whole plant (9%). Methods of preparation of recipes were decoction, infusion and tincture. The use of recipe as an enema was also documented. The study of the pharmacology and mode of action of the plants will contribute immensely to their therapeutic value.

Key words: Ethnobotanical survey, Indigenous recipes, Dysentery, Amathole District, South Africa.

Introduction

Dysentery is an intestinal inflammation, especially in the colon, that can lead to severe diarrhea with mucus or blood in the feces. Patients typically experience mild to severe abdominal pain or stomach cramps, fever and rectal tenesmus (a feeling of incomplete defecation), caused by any kind of infection. In some cases, untreated dysentery can be life-threatening, especially if the infected person cannot replace lost fluids fast enough. There are two main types of dysentery:

Bacillary dysentery caused by genus Shigella and Amoebic dysentery (amoebiasis) caused by *Entamoeba histolytica* (www.medicalnewstoday.com; www.wikipedia.org). Although insufficient data exists, but conservative estimates from the WHO suggest that 90 million cases of Shigellosis are contracted annually, with at least 100,000 of these resulting in death (www.wikipedia.org). Amebiasis is infecting over 50 million people each year, killing about 50,000 (Byrne, 2008). Dysentery is defined as diarrhea with visible blood or bloody diarrhea (Byrne, 2008). Diarrheal diseases represent one of the five leading causes of death worldwide and are the second leading cause of death in children under 5 years of age (behind acute respiratory infections). The World Health Organization on Global Burden of Disease update estimated that there are approximately 4.6 billion episodes of diarrheal illness every year worldwide (Anon., 2008). According to this report, most cases of diarrhea are associated with contaminated food and water sources, and around 2.4 billion people globally have no access to basic sanitation (Anon., 2004).

Many diarrheal deaths are caused by dehydration. An important development has been the discovery that dehydration from acute diarrhea of any aetiology and at any age, except when it is severe, can be safely and effectively treated in over 90% of cases by the simple method of oral rehydration using a single fluid (Shinwari *et al*. 2013). Glucose and several salts in a mixture known as Oral Rehydration Salts (ORS) are dissolved in water to form ORS solution. ORS solution is absorbed in the small intestine even during copious diarrhea, thus replacing the water and electrolytes lost in the faeces. Bloody diarrhea (dysentery) and persistent diarrhea with malnutrition are also important causes of death. Repeated attacks of diarrhea contribute to malnutrition, and diarrheal diseases are more likely to cause death in children who are malnourished. Research has shown, however, that the adverse effects of diarrhea on a child's nutritional status can be lessened or prevented by continuing feeding during the illness. (Brown, 2003).

There are reports on many strains of shigella becoming resistant to common antibiotics, and effective medications are often in short supply in developing countries and the efficacy of herbs in the management of dysentery has been reported: The seed, leaves, and bark of the *Ceiba pentandra* (kapok tree) (Bombacaceae) have been used in traditional medicine by indigenous peoples of the rain forest regions in the Americas, West-Central Africa, and South East Asia to treat this disease (www.wikipedia.org).

In literature, there is dearth of information on the prevalence of dysentery in South Africa. However the South African National Burden of Disease study of the year 2000 found that diarrhea accounted for nearly 3% of all deaths in South Africa (Bradshaw *et al*., 2004). According to the South African health review of 2007, death due to gastroenteritis among children was put at 15% (Rispel &Setswe, 2007), showing increasing mortality.

The important efficacy of medicinal plants in the treatment of various diseases especially diarrhea has been

reported. Panda *et al*., (2012) reported the anti diarrheal activities of medicinal plants of Similipal Biosphere Reserve of Odisha, India. In castor oil-induced diarrhea, 80% protection was observed for *Daniellia oliveri* at doses of 200mg/kg and 60% protection was observed at 100mg/kg and 50mg/kg respectively. For *Ficus sycomorus* 100% protection was observed at doses of 120mg/kg and 60mg/kg, for the n-butanol extract. The antidiarrheal activity was comparable to loperamide 5mg/kg. The extracts of *Daniellia oliveri* and *Ficus sycomorus* have pharmacological activity against diarrhea (Ahmadu *et al*., 2007). Plant-derived chemicals that have antidysenteric potential have become known worldwide as an instant treatment (Jain, 1991; Galvez *et al*., 1993; Loganga *et al*., 2000; Nair & Chanda, 2007; Maity *et al*., 2009; Choudhury *et al*., 2011). These include tannins from Bignoniaceae plants, unripe fruits of Bael (*Aegle marmolos* (L.) Corr, fruits of *Anthum graveolens* L., leaves of *Hibiscus cannabinus* L. whole plant of *Ficus religiosa* L. The pharmacological benefits of these plants were discovered following some ethnobotanical information on medicinal plants (Deeb *et al*. 2013; Shinwari *et al*., 2013).

This study aimed at preservation of indigenous knowledge via the documentation of medicinal plants used for the management of dysentery in Amathole district. The list of plants could form basis for future pharmacological research.

Materials and Methods

Study area: This study was carried out in Amathole District Municipality (ADM) in the heart of the Eastern Cape, South Africa. The district comprises of East London, King William's Town, Mdansane and the provincial administrative capital of Bisho. The province falls within the latitudes 30°00' to 34°15'S and longitudes 22°45' to 30°15 E (Grierson & Afolayan, 1999). The district harbours approximately 1.7 million people with 91% African, 3% coloured and 6% white (Afolayan, 2003; Otang *et al*., 2012). The total area of the district is 23,675 square kilometers with majority of the inhabitants working as farmers, traders, public servants, manufacturers in automobiles, food processing, textile and clothing industries (Jain, 1991; Galvez *et al*., 1993; Loganga *et al*., 2000; Nair & Chanda, 2007; Maity *et al*., 2009; Choudhury *et al*., 2011) (Fig. 1).

Ethnobotanical survey: This study adhered to the research guidelines and ethical protocols of the University of Fort Hare, South Africa. The ethnobotanical surveys conducted were carried out with the full consent of all participants with further verbal agreement and understanding that the research shall not be used for commercial purposes, but to serve as enlightenment on the diversity of medicinal plants used in the management of dysentery and worms in the Eastern Cape Province, South Africa. The modified method of Otang *et al*., (2012) was used. Field survey for the study was conducted from May to August, 2012 in the sites. A semi-structured questionnaire guided interview of respondents (herbalists and traditional healers) was carried put with the help of an interpreter (Bisi-Johnson *et al*., 2010; Wintola & Afolayan, 2010). Respondents were randomly selected based on their indigenous knowledge of management of dysentery. The information on plants were documented as follows: the local name of the plant, life form, parts used, method of preparation, mode of administration, other uses and references for the uses. Such studies have also been reported elsewhere (Nadeem *et al*., 2013; Mahmood *et al*., 2013).

Fig. 1. Map of the study area.

Table 1. Medicinal plants used in the treatment of dysentery in the Eastern Cape Province, South Africa.

Scientific name	Local name (in *Xhosa*)	Family	Part used	Method of preparation	Frequency of citation (n=173)	Other uses	Botanical references
Acacia Karoo Hayne	*Umnga, intlaka*	Fabaceae	Leaf, bark and gum	Infusion and concoction	7	Diarrhoea and haemorrhage	Watt & Breyer-Brandwijk, 1962; Smith, 1966; Mabogo, 1990; Hutchings *et al*., 1996; Olajuyigbe & Afolayan, 2012
Acacia mearnsii De Wild.	*Idywabasi*	Fabaceae	Bark and leaf	Infusion and concoction	5	Diarrhoea	Bisi- Johnson *et al*., 20 Mabogo, 199010; Olajuyigbe & Afolayan, 2012
Alepidea amatybica Eckl. and Zeyh	*Iqwili*	Apiaceae	Rhizome	Decoction of the root	11	Abdominal cramp	Bisi- Johnson *et al*., 20 Mabogo, 199010; Olajuyigbe & Afolayan, 2012
Bridelia micrantha (Hochst.) Bail	*Umhlalamakweba*	Euphorbiaceae	Leaf	Decoction	2	Burning, itching	Ngueyem *et al*., 2009; Shahid, 2012
Bulbine abyssinica Eckl. and Zeyh	*Iyeza, utswelana, Uyakayakana*	Asphodelaceae	Leaf and root	Decoction of leaf and root	1	-	Pooley, 1998; Bisi- Johnson *et al*., 2010; Olajuyigbe & Afolayan, 2012;
Bulbine alooides (L.) Willd.	*Irooiwater*	Asphodelaceae	Root	Decoction	1	Diarrhoea	Adewusi & Afolayan 2010;
Bulbine asphodeloides (L.) Spreng.	*Utswelana, Ibhucu, Umthi, Uyakayakana*	Asphodelaceae	Leaf, tuber	Decoction of the root/tuber	2	Diarrhoea	Iwalewa *et al*., 2007; Olajuyigbe & Afolayan, 2012
Bulbine latifola (L.f). Roem. et Schult	*Ibuchu, ingcelwane*	Asphodelaceae	Leaf, root	Decoction	1	Diarrhoea	Olajuyigbe & Afolayan, 2012
Calpurnia aurea (Ait.) Benth	*inDloli,*	Fabaceae	Leaf and stem	Decoction	1	Diarrhoea and hemorrhoids	Adedapo *et al*., 2008
Carpobrotus edulis (L.)L.Bolus	*Unomatyumtyum*	Mesembyanthemaceae	Leaf juice Fruit	Infusion	3	Digestive troubles, tuberculosis, wounds and HIV/AIDS	Forbes,1986; Van Wyk, 2008; Otang *et al*., 2012
Centella asiatica (L.) Urb	*Inyongwane, iphuzi*	Apiaceae	Root and leaf	Decoction	2	Stomach disorders and diarrhoea	Van Wyk, 2008b; Olajuyigbe & Afolayan, 2012
Clausena anisata (Wild.) Hook.f.ex Benth	*Iperepesi*	Rutaceae	Leaf, bark	Decoction and Infusion	3	Diabetes	Hutchings *et al*., 1996; Senthikumar & Venkatesalu, 2009
Curtisia dentata (Burm.f).C.A.Sm.,	*umLahleni, umGxina, Uzintlwa*	Cornaceae	Bark	Decoction	7	Diarrhoea, blood purification, aphrodisiac, pimple	Doughari *et al*., 2011; Grierson & Afolayan, 1999
Diospyros lycioides Dest.	*Umbulawa*	Ebenaceae	Bark, root	Decoction	2	Toothache	Hutching *et al*., 1996; Fawole *et al*., 2009
Diospyros mesphiliformis	*Musuma*	Ebenaceae	Bark, root	Decoction	2	Fever, abdominal cramp	Samie *et al*., 2010
Ekebergia capensis Sparrm.	*uManaye, umGwenyawezinja*	Meliaceae	Root, Bark	Decoction	2	Diarrhoea, intestinal complaints	Verschaeve & Van Staden, 2008; Olajuyigbe & Afolayan, 2012
Elephantorrhiza burkei Benth	*Intololwane*	Mimosaceae	Whole plant	Decoction	2	Diarrhoea	Watt & Breyer- Brandwijk, 1962; McGaw & Eloff., 2008
Elephantorrhiza elephantina (Burch.) Skeels	*Intolwane*	Mimosaceae	Root	Decoction	5	Diarrhoea	Bryant, 1966; Mathabe *et al*., 2006; Appidi *et al*., 2008; Van Wyk *et al*., 2009; Bisi- Johnson, *et al*., 2010; Madikizela *et al*., 2012
Elytroppus rhinocerotis (L.f.) Less.	*renesterbos*	Asteraceae	Twig	Infusion and tincture	1	Diarrhoea	Van Wyk *et al*., 1997
Eucalyptus camaldulensis Dehnh.	*Ugamthriya*	Myrtaceae	Leaf	Decoction	2	Diarrhoea	Hutchings *et al*., 1996
Euphorbia hirta L.	*Intsema*	Euphorbiaceae	Root, leaf	Infusion	6	Diarrhoea, Worms, cold, bronchitis and asthma	Ogueke *et al*., 2007; Kumar *et al*., 2010; Otang *et al*., 2012
Gladiolus sericea-villosus Hook.f	*Umnunge, Umlunge*	Iridaceae	Corm	Decoction	2	Enema, Impotence, menstrual pain	Hutchings *et al*., 1996; Bisi-Johnson *et al*., 2010
Heteromorpha arborescens (Spreng) Cham.& Schltdl	*Umbangandlala,mkatlal*	Apiaceae	Bark and leaf	Decoction	2	Headaches, fever, cough, infertility, abdominal pain, colic	Van Wyk *et al*., 1997; Lundgaard *et al*., 2005
Hippobromus pauciflorus (L.f) Radlk	*Ulathile, Ilathile*	Sapindaceae	Bark, root, leaf	Decoction	5	Diarrhoea	Pendota *et al*., 2008; Bisi- Johnson *et al*., 2010
Hydnora africana Thunb.	*Umavumbuka Umafumbuka, Ubuklunga*	Hydronaceae	Whole plant	Infusion and decoction	11	Diarrhoea, Kidney and bladder complaints	Watt & Brayer-Brandwijk, 1962; Hutchings *et al*., 1996; Van Wyk & Gericke, 2000; Bisi- Johnson *et al*., 2010; Madikizela *et al*., 2012 Olajuyigbe & Afolayan, 2012
Iconotis leonurus (L).L.	*Imvovo*	Lamiaceae	Whole plant	Infusion, decoction and enema	11	Diarrhoea	Olajuyigbe & Afolayan, 2012
Ipomoea crassipes Hook.,	*Ubhoqo*	Convolvulaceae	Whole plant	Infusion and decoction	3	Diarrhoea	Olajuyigbe & Afolayan, 2012

Table 2. (Cont'd.).

Scientific name	Local name (in *Xhosa*)	Family	Part used	Method of preparation	Frequency of citation (n=173)	Other uses	Botanical references
Lauridia tetragonia (L.f.) R.H.Archer	*Umdlavuza*	Celstraceae	Bark	Infusion	7	Diarrhoea and diabetes	Oyedemi *et al*., 2009
Leonotis leonurus (L) R. BR.	*umfincamfincane*	Lamiaceae	Leaf, stem and back	Decoction	3	Cold coughs, amenorrhoea, influenza, bronchitis, high blood pressure and headache	Iwalewa *et al*., 2007; McGaw & Eloff, 2008; Maphosa *et al*., 2012
Monsonia augustifolia E.Mey. ex A. Rich.,	*Iggitha, Unoboyaya*	Geraniaceae	Whole plant	Decoction	2	Diarrhoea, cold, inflammation	Roberts, M., 1990; Hutchings *et al*., 1996; Van Wyk, 2008
Pelagonium luridium (Andrews) Sweet	*Ishwaqa, Umsongelo*	Geraniaceae	Leaf, root, bulb	Decoction	4	Diarrhoea	Watt & Breyer-Brandwijk, 1962; Brendler & Van Wyk, 2008; Van Wyk *et al*., 2009; Bisi- Johnson *et al*., 2010; Madikizela *et al*., 2012
Pelagonium reniforme Curt.	*Umkumiso/Uvendle, Intololwana*	Geraniaceae	Tuber	Infusion	4	Diarrhoea	Van Wyk, 2008; Adewusi & Afolayan 2010; Olajuyigbe & Afolayan, 2012
Peltophorum africanum Sond	*isiKhaba-mkhombe,*	Fabaceae	Stem and root	Decoction	2	Wounds, toothache and throat sores, stomach ailment and intestinal parasite	Theo *et al*., 2009
Plantago lanceolata L., folium	*Ubenlela*	Plantaginaceae	Leaf	Infusion	1	Diarrhoea, stomach problems	Olajuyigbe & Afolayan, 2012
Protorhus longifolia (Bernh.ex.C.Krauss) Engl.	*Uzinthwa*	Anacardiaceae	Bark	Decoction	4	Diarrhoea	Appidi *et al*., 2008
Rhoicissus tridentata (L.f.) Wild and R.B.Drumm	*Chithibhuinga*	Vitaceae	Root	Decoction	6	Stomach ailment	Hutchings *et al*., 1996; McGaw & Eloff, 2008; Van Wyk *et al*., 2009
Rubia petiolaris DC.	*Impendulo, ubulawu*	Achanthaceae	Root and leaf	Infusion, decoction and concussion	1	Diarrhoea	Olajuyigbe & Afolayan, 2012
Sarcophyte sanguine Sparrm.,	*umavumbuka*	Balanophoraceae	Whole plant	Infusion and decoction	2	Diarrhoea	Iwalewa *et al*., 2007; Olajuyigbe & Afolayan, 2012
Schizocarphus nervosus (Burch.) Van der Merve	*Umagaqana, inkwitelu*	Hyacinthaceae	Rhizome	Decoction	1	Diarrhoea	
Schotia brachypetala Sond.	*Ishimmunyane*	Fabaceae	Bark and root	Decoction	1	Diarrhoea	Van Wyk *et al.*, 1997; Olajuyigbe & Afolayan, 2012
Schotia latifola Jacq.	*Mapipa, Umgxam*	Fabaceae	Bark	Decoction	5	Diarrhoea	Traditional heelers
Scilla nervosa (Burch.) Jessop	*Umagaqana, Umasixabane, Ingema*	Hyacinthaceae	Bulb and root	Infusion	2	Rheumatic fever, diarrhoea	Rood, 1994; Silayo *et al*., 1999
Sclerocarya birrea (A. Rich.) Hochst. Subsp. Caffra (Sond.) kokwaro	*Umganu, morula*	Anacardiaceae	Root, bark and leaf	Decoction and Enema	2	Diarrhoea, stomach problem	Watt & Breyer- Brandwijk; Hutchings, 1996, Van Wyk *et al*., 1997.
Solanum aculeastrum Dun.	*Umthuma*	Solanaceae	Root, bark and berries	Infusion, decoction and concussion	5	Diarrhoea, hemorrhoids	Hutchings *et al*., 1996; Bisi- Johnson *et al*., 2010; Madikizela *et al*., 2012
Sutherlandia frutenscens (L.) R. Br.	*Umnwele*	Fabaceae		Decoction	2	Stomach ailment, cancer, liver problem, indigestion	Van Wyk *et al*., 1997; Wyk & Gericke, 2000
Tacoma capensis (Thumb.) Lindl	*Umsilingi*	Bignoniaceae	Leaf, bark	Infusion	3	Diarrhoea, fever	Hutchings *et al*., 1996; Iwalewa *et al*., 2007; Madikizela *et al*., 2012
Trema orientalis (L) Blume	*Umbhangabhanga iphuhane,*	Ulmaceae	Leaf	Decoction	2	-	Hutchings *et al*., 1996; Madikizela *et al*., 2012
Typha capensis (Rohrb.) N.E.Br.,	*Ingoboka, ingcongolo*	Typhaceae	Rhizome	Decoction	1	Diarrhoea	Olajuyigbe & Afolayan, 2012
Viscum capense (Linn.)	*umtomvi*	Viscaceae	Whole plant	Infusion	1	Diarrhoea	Rood, 1994; Silayo *et al*., 1999;
Xysmalobium undulatum (L.) W.T. Aiton	*Ishongwe Itshongwe*	Asclepiadiaceae	Root/leaf	Decoction	9	Headache, stomach cramp, diarrhoea	Pujol, 1990; Bisi-Johnson *et al*., 2010; Otang *et al*., 2012
Ziziphus mucronata Wild. subsp *mucronata*	*Umphafa*	Rhamnaceae	Bark, leaf and root	Decoction and concoction	4	Diarrhoea	Hutchings *et al*., 1996; Appidi *et al*., 2008; Van Wyk *et al*., 2009 Madikizela *et al*., 2012

Identification and preservation of medicinal plant specimens: Standard method was followed with regard to collection of plant materials, drying, preparation and preservation of plant specimens (Jain, 1976; Vijayalakshimi *et al*., 2011). The plants were initially identified by their vernacular names and later validated by Prof DS Grierson and the floristic works of South Africa (Dold & Cocks, 1999; Bhatt & Jacobs, 1995 and Van Wyk *et al*., 1997). Voucher specimens were also prepared and deposited at the Griffen's herbarium, in the Department of Botany, University of Fort Hare, South Africa Further characterisation of the plants and their previous usage was established by a literature search (Togola *et al*., 2005; Otang *et al*., 2012) with the online databases available in the library of the University of Fort Hare, like Ebscos, Elsevier, Science Direct, Jstor, Springer links.

Results and Discussion

A total of 55 informants aged between 25-65 years participated in the study, including (25%) traditional healers, (15%) herbalist and (15%) rural elders. The fact that more than 70% of the informants are less than 50 years old implies that the use of herbal remedy in the management of dysentery is still not yet endangered in the study area. The informants were 34 females and 21 males, the participation of females in the use of herbal remedy for the management of dysentery may be attributed to the fact that women have immense knowledge of medicinal plants because they are generally responsible for the upkeep of the home and families (Zobolo & Mkabela, 2006). Madikizela *et al*., (2012) also reported that females recorded the highest % of informant in a survey conducted on the plants used for the treatment of diarrhea in the study area.

The profile of medicinal plants used in the management and treatment of dysentery is presented (Table 1). Fifty-one (51) plant species from 32 families were identified as being used to treat dysentery. The most represented family was the Fabaceae with seven (14%) species for the management of dysentery, followed by Asphodelaceae with four species (8%), and Apiaceae and Geraniaceae with three (6%) species each. The Anacardiaceae, Ebenaceae, Euphorbiaceae, Hyacinthaceae Lamiaceae and Mimosaceae were represented by two (4%) species each, the other families;, Achanthaceae, Aclepiadiaceae Asteraceae, Balanophaceae, Bignoniaceae, Celstraceae, Convolvulaceae, Cornaceae, Hydronaceae, Iridaceae, Meliaceae, Mesembyanthemaceae, Myrtaceae, Plantaginaceae, Rhamnaceae, Rutaceae, Sapindaceae, Solanaceae, Typaceae, Ulmaceae, Viscaceae and Vitaceae had one (2%) species each associated with the treatment of dysentery. This is indicative of the large biodiversity of flora of South Africa with its rich ethnomedicinal properties, which serves as the main resource of phytotherapy for the large majority of the people. From the rich biodiversity of South Africa, with up to 30,000 species of plants, about 3,000 species have been detected as being used as medicinal plant across the country (Van Wyk *et al*., 1997; Otang *et al*., 2012). The use of traditional remedies is a cultural practice of the Amathole people and they are belief in the potency of the herbs which are easily accessible and affordable to the people especially the poor people.

Plant parts used in the management of dysentery: The use-value of various plant parts is presented Fig. 2. The leaf (28%) was mostly used for the treatment of dysentery, followed by the root (24%), bark (22%) and the whole plant (9%). The rhizome and stem were cited for the treatment of dysentery in equal proportion (4%). Bulb and tuber (2%) were also cited for the treatment of dysentery in equal proportion (2%). Other plant parts such as the twigs, fruits corm, gum and berries (1%) were also mentioned, but in very small proportion (Fig. 2). The preference for the use of leaves in treatment might due to its potency in treatment (Zainol *et al*., 2008; Moshi *et al*., 2009).

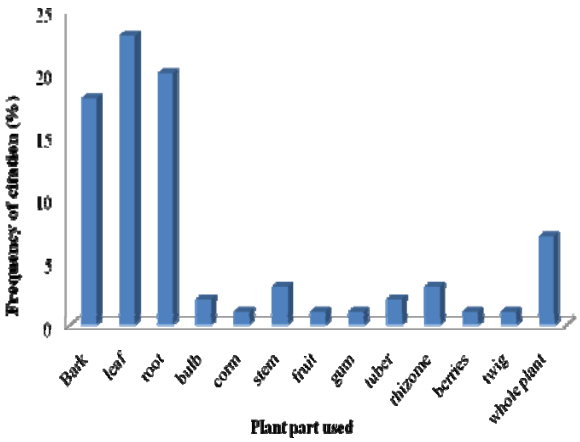

Fig. 2. Frequency of Plant parts used for treating dysentery.

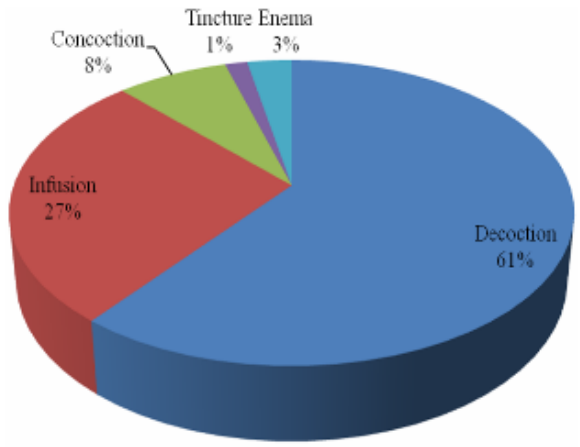

Fig. 3. Different preparation methods for treating dysentery.

Preparation and administration of the herbal medicine: The indigenous method of preparation of remedies includes the use of plants singly (monorecipe) or in combination with other plants (multiple plant recipes). Methods of preparation recorded in the present study were decoction (61%), infusion (27%), other methods such as tincture and enema (12%) (Fig. 3). The frequent use of decoction could be attributed to the fact that the pathogens associated with dysentery colonise the stomach and maximum efficacy of the herbal drug would demand a close interaction between the herbal drug and the causative agent. It is noteworthy that some plants such as *Sclerocarya birrea, Iconotis*

leonurus and Elytroppus rhinocerotis had multiple routes of administration in the treatment of dysentery. Enema is a treatment for medical conditions like constipation and encopresis or part of alternative health therapies. It is used to administer certain medical or recreational drugs and is used for rehydration therapy (proctoclysis) in patients for whom intravenous therapy is not applicable (Bruera *et al*., 1998). The use of enema in the treatment of stomach ailments is a common practice in African traditional medicine (Ndenecho, 2009; Coopoosamy & Naidoo, 2012). Enema can help to get rid of waste build up in the colon from processed foods and high fat and sugar diets. Which may cause weak peristalsis that may otherwise caused constipation and IBS, thus making the internal colon environment refreshed and free from toxins. The benefits and hazards of this rectal route has earlier been reported by Doyle, 2005; Smith *et al*., 1987; Tarkang *et al*., 2012, hence the need for special formulation techniques are required for rectal administration to be carried out by well trained personnel. For example, enema is commonly used during labour and as fatal anaphylaxis (Jensen-Jarolim *et al*., 1998). However, potential benefits of nutritional value have been documented for its proximate analysis globally (Hussain *et al*., 2013).

This study is in line with the ongoing efforts of previous authors towards documentation of indigenous knowledge of management and treatments of gastroenteric disorders in South Africa. Similar research has been carried out on plants used for the management of diarrhoeal in some District Municipalities of the Eastern Cape Province (Appidi *et al*., 2010; Bisi Johnson *et al*., 2010; Olajuyigbe & Afolayan, 2012) and other parts of the world (Jain, 1991; Galvez *et al*., 1993; Loganga *et al*., 2000; Nair & Chanda, 2007; Maity *et al*., 2009; Samie *et al*., 2010; Choudhury *et al*., 2011; Shanmugam *et al*., 2011; Panda *et al*., 2012).

Conclusion

This study has contributed immensely to the preservation of indigenous knowledge. The survey will be helpful in biodiversity conservation and future phytomedicine research.

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