

Short Communication

An ethnobotanical study of plants used for the treatment of diabetes in the Eastern Cape Province, South Africa

P. Erasto¹, P. O. Adebola², D. S. Grierson¹ and A. J. Afolayan^{1*}

¹Department of Botany, University of Fort Hare, Alice 5700, South Africa.

²Cultivar Development Division, ARC-Vegetable and Ornamental Plant Institute, Private Bag X293, Pretoria 0001, South Africa.

Accepted 10 November, 2005

Diabetes mellitus is one of the commonest diseases affecting the citizens of both developed and poor countries. In South Africa, the number of people suffering from diabetes is believed to be rising steadily. An ethnobotanical study of plants used by the traditional healers, herbalists and rural dwellers for the treatment of diabetes mellitus was conducted in the Eastern Cape Province. The study revealed 14 plant species belonging to six families namely; Asteraceae, Hypoxidaceae, Apocynaceae, Asphodelaceae, Apiaceae and Buddlejaceae. The use of infusions from plant leaves and roots was the commonest method of herbal preparation. In all cases, the treatment involved drinking the extracts for a long period of time. There was a general belief on the efficacy of the prepared extracts.

Key words: Medicinal plants, traditional medicine, diabetes mellitus.

INTRODUCTION

Diabetes mellitus is a common and very prevalent disease affecting the citizens of both developed and developing countries. It is estimated that 25% of the world population is affected by this disease. Diabetes mellitus is caused by the abnormality of carbohydrate metabolism which is linked to low blood insulin level or insensitivity of target organs to insulin (Maiti et al., 2004). In South Africa, the number of people suffering from diabetes is believed to have been rising steadily over the past two decades. Several reports have stressed the high mortality from diabetes particularly amongst black South Africans. The prevalence is predicted to increase alongside world figure which is estimated to hit 220 million by the year 2010 (Erasmus et al., 1999; Levitt et al., 1993; Amos et al., 1997).

Recently, there has been a resurgent interest in the herbal treatments of diabetes. The growing public interest

and awareness of natural medicines have led the pharmaceutical industry and academic researchers to pay more attention to medicinal plants (Day, 1998). The apparent reversal of trend from western to herbal medicine is partly due to the fact that synthetic drugs have always shown adverse reactions and other undesirable side effects. This has led to the belief that natural products are safe because they are more harmonious with biological systems (Atal, 1983; Erasto, 2003). In addition, the cost of administering modern anti-diabetic drugs is beyond the reach of people in the low income group and those living in the rural areas. In the Eastern Cape, South Africa, majority of the people are rural dwellers, hence the use of plants for the treatment of common diseases such as diabetes is very common.

In traditional medicine, the number of plants used in the treatment of diseases associated with physiological disorder such as diabetes is limited. These plant species are regarded as precious and highly valued. Considering the rate at which the vegetation is getting depleted in this part of the world, there is the need to document the precious knowledge of these plants as well as the

*Corresponding Author. E-mail: Jide@eastcape.net; Fax: +27 40 6022 323.

Table 1. Plants used for the treatment of diabetes in the Eastern Cape Province, South Africa.

Family & scientific name	Local name	Parts used	Preparation of medicine
Asteraceae <i>Herichrysum odoratissimum</i> L.	Imphepho	Whole plant	A fresh plant is crushed, boiled and the infusion taken orally.
<i>Herichrysum nudifolium</i> L.	Ichocholo	Leaves, roots	Fresh leaves or roots are boiled, then taken orally.
<i>Herichrysum petiolare</i> H & B.L.	Imphepho	Whole plant	A fresh plant is crushed, boiled and the concentrated solution is taken orally.
<i>Artemisia afra</i> Jacq.	Umhlonyane	Leaves, roots	Leaves or roots are boiled, then the infusion is mixed with sugar to mask the bitterness.
<i>Vernonia oligocephala</i> Sch. Bip.	Umhlungu-hlungu	Leaves, twigs, roots	Fresh leaves, roots or twigs are pulverized, and the infusion taken orally.
<i>Vernonia amygdalina</i> Del.	Umhlungu-hlungu	Leaves	Pulverized fresh leaves are soaked in Water and the solution is taken orally.
<i>Brachylaena discolor</i> DC.	UmPhahla	Leaves	Leaves are boiled and the infusion is taken orally
Hypoxidaceae <i>Hypoxis hemerocallidea</i> Fisch. & C. A	Inongwe	Corms	Fresh corms are crushed, boiled and taken orally.
<i>Hypoxis colchicifolia</i> Bak. Asphodelaceae	Inongwe	Corms	Fresh corms are crushed, boiled and taken orally.
<i>Bulbine natalensis</i> (Syn. <i>B. latifolia</i>) Mill.	Ibhucu	Roots	Fresh roots are boiled, and the infusion is taken orally.
<i>Bulbine frutescens</i> L.	Ibhucu	Roots	The infusion is made from fresh boiled roots and is taken orally.
Apocynaceae <i>Catharanthus roseus</i>	Isisushlungu	Leaves	The infusion is made from boiled leaves and taken orally.
Apiaceae <i>Heteromorphica arborescens</i> . Hochst. Ex A. Rich.	Umbangandlala	Leaves and roots	The herb is made from boiled leaves or roots and taken orally.
Buddlejaceae <i>Chilianthus olearaceus</i> Burch.	Umgeba	Leaves and twigs	The infusion is made from leaves or twigs and taken orally.

experience of the traditional healers and herbalists. In this paper, we present the local and scientific names of the plants used for the treatment of diabetes in this province as well as the parts of the plants used and the various methods of preparation and administration.

MATERIALS AND METHODS

The study area

This study was carried out at various locations in the Eastern Cape Province. The area falls within the latitudes 30°00' – 34°15'S and longitudes 22°45' – 30°15'E. It is bounded by the sea in the east and the drier Karroo (semi-desert vegetation) in the west. The elevation ranges from sea level to approximately 2200 m in the north, and the vegetation is veld type 7, known as the Eastern Cape thorn veld (Masika and Afolayan, 2003). This area consists of many villages which are generally classified as rural and poor.

Collection of information

Adopting the method of Jovel et al. (1996), general conversation and questionnaires were used to obtain ethnomedical information.

The data collected included local names of the plants, the parts of the plant used, method of herbal preparation and the perceived efficacy of the medicine. Some plants were obtained directly from the healers and herbalists, while others were collected during walk through the forest accompanied by traditional healers, herbalists or rural dwellers. The plants were identified by their vernacular names, and later validated at the University of Fort Hare herbarium. Voucher specimens were also prepared and deposited in the herbarium.

RESULTS AND DISCUSSION

The study revealed 14 plant species belonging to six families that are frequently used for the treatment of diabetes in the Eastern Cape Province (Table 1). In this study members of the family Asteraceae were the most commonly used plants for the treatment of diabetes, constituting 50% of the plants. Other families were, Hypoxidaceae (two species) Asphodelaceae (two species) while Apocynaceae, Apiaceae and Buddlejaceae had one species each.

The leaves were reported to be the most used part of the plants, constituting 40% of herbal preparation. This was followed by the roots which constituted 30% while corms, twigs and whole plant were rarely used for the preparation of the medicines. The commonest method of herbal preparation was infusion (Table 1). This is made by boiling pulverized or loose plant materials in water. Application of the herbal remedies was generally by drinking, usually on daily basis for very long period of time.

Four plants were frequently mentioned and highly recommended by both the traditional healers and rural dwellers. These are *Herichrysum odoratissimum*, *Herichrysum petiolare*, *Hypoxis hemerocallidea* and *Hypoxis colchicifolia*. Information from the literature revealed that these plants are used for the treatment of other diseases of both human and livestock in the Eastern Cape Province. *Hypoxis colchicifolia* is reported to be effective in the treatment of gallsickness and redwater (babesiosis) diseases in cattle (Masika and Afolayan, 2003), while *H. hemerocallidea* also known as a wonder and miracle cure herb, is used for the alleviation of many immune related ailments such as wounds, cold, flu, arthritis, tumor and cancer and HIV/AIDS (Grierson and Afolayan, 1999; Singh, 1999).

The mode of action of the extracts from these plants is uncertain, however many antidiabetic plants act, at least in part, through their fibre, vitamin or mineral contents and some secondary metabolites (Day, 1998). Mineral deficiencies are common in diabetic patients which aggravates insulin deficiency. Several minerals found in some medicinal plants have been reported to be co-factors that signal intermediaries of insulin action and key enzymes of glucose metabolism (Day, 1990, 1998). This study has again unveiled the vital roles that medicinal plants play in the primary health care of the people of this province. Work is in progress on the phytochemical characterization and pharmacological validation of some of these plants.

ACKNOWLEDGEMENT

The authors appreciate the support of the National Research Foundation of South Africa.

REFERENCES

- Amos AF, McCarty DJ, Zimmet P (1997). The rising global burden of diabetes and its complications: Estimates and projections to the year 2010. *Diabetic Med.* 14: S7-S85.
- Atal CK (1983). Potential newer medicinal plants: Report of the seminar on medicinal plants, phytochemical and bulk drugs. Chemexcil, Cooperage Road, Bombay, India, pp. 34-36.
- Day C (1990). Hypoglycaemic compounds from plants. In *New Antidiabetic*, pp. 267-278 [CJ Bailey and PR Flatt, editors]. London: Smith-Gordon.
- Day C (1998). Traditional plants treatments for diabetes mellitus: pharmaceutical foods. *Brit. J. Nutr.* 80: 5-6.
- Erasmus RT, Blanco EB, Okesina AB, Gqweta Z, Matsha T (1999). Assessment of glycaemic control in stable type 2 black S. African diabetics attending a peri-urban clinic. *Postgrad. Med. J.* 75: 603-606.
- Erasto P (2003). Phytochemical analyses and antimicrobial studies on *Bolusanthus speciosus* and *Cassia abbreviata*. MPhil thesis, Chemistry Department, University of Botswana, pp. 2-3.
- Grierson DS, Afolayan AJ (1999). An ethnobotanical study of plants used for the treatment of wounds in the Eastern Cape, South Africa. *J. Ethnopharmacol.* 67: 327-332.
- Jovel EM, Cabanillas J, Towers GHN (1996). An ethnobotanical study of the traditional medicine of the Metizo people of Suni Miraflores, Loreto, Peru. *J. Ethnopharmacol.* 53: 149-156.
- Levitt N, Katzenellenbogen J, Bradshaw D, Hoffman M, Bonnice F (1993). The prevalence and identification of risk factor for NIDDM in urban Africans in Cape Town, S. Africa. *Diabetes Care*, 16:601-607.
- Maiti R, Jana D, Das UK, Ghosh D (2004). Antidiabetic effect of aqueous extract of seed of *Tamarindus indica* in streptozotocin-induced diabetic rats. *J. Ethnopharmacol.* 92: 85-91.
- Masika PJ, Afolayan AJ (2003). An ethnobotanical study of plants used for the treatment of livestock diseases in the Eastern Cape Province, South Africa. *Pharm. Biol.* 41: 16-21.
- Singh Y (1999). *Hypoxis*: Yellow stars horticulture, folk remedies and conventional medicine. *Veld and Flora*, 85: 123-125.