THE ROLE OF TRADITIONAL MEDICINE IN THE TREATMENT OF DIABETES MELLITUS

Many people in South Africa turn to traditional medicine to treat their chronic diseases.

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About 80% of the people in southern Africa use traditional medicine, often in conjunction with conventional medications, raising the possibility of synergistic or antagonistic drug interactions. It is clearly important that we evaluate the safety, efficacy, and quality of traditional medicines. Standardisation of active ingredients is also required. The World Health Organization (WHO) defines traditional medicine as including diverse health practices, approaches, knowledge and beliefs incorporating plant, animal and/or mineral-based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to maintain well-being, as well as to treat, diagnose or prevent illness. This article focuses mainly on plant-based medicines (herbs).

Herbal medicines have been used for thousands of years in many different cultures. The high cost of modern medication has also contributed to an increased use of herbal medicines. This has stimulated research into the various uses and applications of herbal medicines.

South Africa is blessed with a vast variety of medicinal herbs and plants, resulting in a rich heritage of traditional remedies still in use today. Traditional herbal remedies from other parts of the world, particularly the East Asian countries, are widely used. This is not as true of herbal remedies from Africa. However, many people in southern Africa use these remedies daily, for illnesses ranging from fatigue to diabetes and HIV/AIDS.

Fig. 1. Aloe ferox. (*Photo: REK.*)

AFRICAN HERBAL REMEDIES

Aloe ferox

Aloe ferox (Ikhala), indigenous to South Africa and prolific in the eastern parts of the country, is a commonly used natural ingredient (Fig. 1).
Extracts from various parts of the plant are included in laxatives and treatments for arthritis, eczema, conjunctivitis, hypertension, diabetes and stress. It is also used in cosmetics and in livestock medicines.

African potato

Another reputed immune booster is the infamous African potato, *Hypoxis hemerocallidea*, commonly known as *Inkomfe* (Fig. 2).

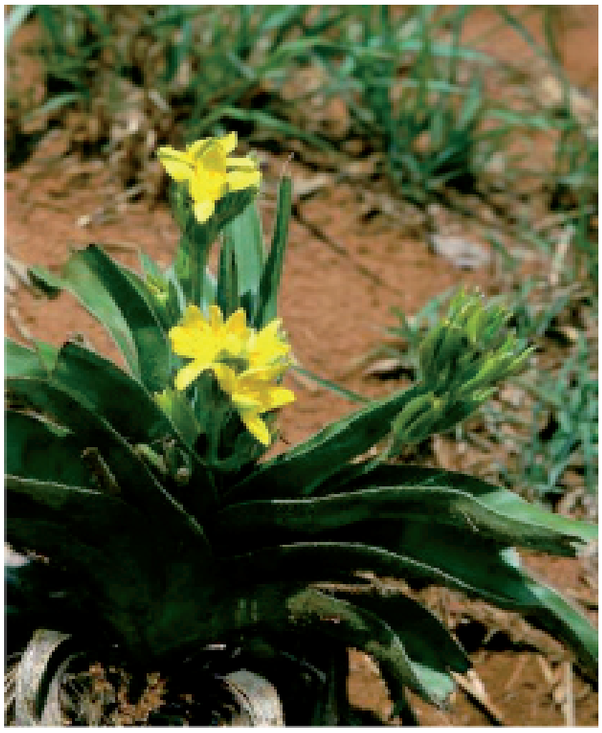

Fig. 2. The African potato. (Photo: Graham Duncan.)

Regularly featured in the media as the focus of a debate regarding the Department of Health's position on traditional remedies, the unassuming tuber has become the representative of all African traditional remedies.

Customarily used as a treatment for complaints of the urinary and reproductive systems, including prostatic hypertrophy and testicular tumours, it is also prescribed as a tonic and mood enhancer. An extract of African potato corms produced dose-dependent, significant reductions in the blood glucose concentrations of fasted normal and diabetic rats.

Cancer bush

Sutherlandia frutescens (Umnwele) has been described as one of the most valuable of southern Africa's medicinal plants. The properties of the cancer bush were originally recognised by the Khoi and San peoples (Fig. 3).

Tinctures, infusions and decoctions of the leaves and stems of *Sutherlandia frutescens* have been used for generations for a host of ailments including poor appetite, dysentery, diabetes, influenza, kidney and liver conditions, heart failure and anxiety. Several highly active compounds including canavine, pinitol and the amino acid GABA are present in the plant, suggesting that there may be a scientific basis for its use in treatment of chronic illnesses.

Fig. 3. Sutherlandia frutescens. *(Photo: Graham Duncan.)*

Shoot extracts of *Sutherlandia frutescens* were found to have analgesic and anti-inflammatory effects and caused significant hypoglycaemia in diabetic rats.

Buchu

The San and Khoi were also fond of buchu *(Agathosma betulina)* (Fig. 4) for both cosmetic and antibiotic applications. These practices were later adopted by the migrant Dutch.

Fig. 4. Buchu (Photo: REK.)

Stomach ailments and kidney and urinary tract diseases were most commonly treated with buchu, which is now also used as a diuretic.

Boegoe-brandewyn, a potent combination of the plant with brandy, was a popular Cape remedy for stomach afflictions of every description. Occasionally, buchu is applied externally to wounds and bruises.

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Wild dagga

Numerous traditional uses have been attributed to *Leonotis*, or wild dagga (Fig. 5). Interestingly, this includes the relief of epilepsy.

Fig. 5. Wild dagga. (Photo: Graham Duncan.)

There have been some indications that it was smoked as an alternative to marijuana, although this is doubtful as the plant is only mildly narcotic.

Externally, decoctions are applied for various skin complaints and muscle pain. Internally, wild dagga is commonly used for chest ailments, including bronchitis, influenza and coughs. Relief of headaches, high blood pressure, diabetes, asthma and viral hepatitis, has also been reported. *Leonotis* has been shown to cause significant hypoglycaemic effects in normal and diabetic rats.

DRUG INTERACTIONS BETWEEN TRADITIONAL AND CONVENTIONAL MEDICINES

Herbal medications have been shown to affect the serum levels of drugs through their effects on the cytochrome P450s and P-glycoproteins. The cytochrome P450s are a family of more than 60 enzymes that metabolise endogenous and exogenous compounds, including many drugs. P-glycoproteins are transporters found in gut, gonads, kidneys, the biliary system, brain and other organs which transport hydrophobic substances, including drugs, out of organs and into the gut, urine, and bile. Antiretroviral medications such as HIV protease inhibitors and non-nucleoside reverse transcriptase inhibitors are predominantly metabolised through the CYP3A4 oxidative metabolic pathway. Protease inhibitors are also substrates for the P-glycoprotein drug transporters. Mills *et al.* studied the effect of *Hypoxis hemerocallidea* (African potato) and Sutherlandia (cancer bush) on CYP3A4 and P-glycoprotein. Both *H. hemerocallidea* and Sutherlandia inhibited CYP3A4 and P-glycoprotein expression *in vitro*. These results highlight the extreme caution that should be taken in introducing herbal drugs into the routine care of HIV patients.

TREATMENT OF DIABETES

Since there is no cure for diabetes, maintaining good health requires a lifelong commitment to blood sugar control. The self-care requirements of diabetes, or any chronic disease, can be psychologically difficult to adjust to, and many patients resist the necessity to follow a regular, day-in and day-out care plan. The result is that some people seek alternative treatments, if not outright 'miracle cures' that seem easier or more natural and that allow them to avoid dealing with the realities of a chronic disease.

Herbal medicines are gaining popularity in the treatment of diabetes, with a variety of plant-derived preparations being promoted as capable of controlling blood sugar levels. The MRC are currently studying several plants from the Eastern Cape which have shown some promise in the treatment of diabetes. However, so far, there are no conclusive trials on any of these preparations.

Tea polyphenolics, apart from their much-cited antioxidant activities, also have been reported to inhibit α-amylase and sucrase. The α-glucosidase inhibitors are currently the most commonly used oral agents for ameliorating postprandial hyperglycaemia. *Pterocarpus marsupium* (an Ayurvedic medicinal plant advocated for use in diabetes mellitus) exhibits significant antidiabetic activity and corrects cholesterol and triglycerides in diabetic rats and it may have insulin-like properties.

Gymnema sylvestre, an Indian medicinal plant, has long been known to possess antidiabetic activity and it seems to suppress an individual's ability to taste anything sweet. Extracts of this plant have been reported to possess a variety of actions related to antidiabetic properties such as reducing insulin requirements by possibly enhancing endogenous insulin availability, improving vitiated blood glucose homeostasis, better control of the hyperlipidaemia associated with diabetes, and reduction in amylase activity. The dried powder of *G. sylvestre* was found not only to regulate blood sugar in alloxan-induced diabetic rats, but also to increase the activity of the enzymes responsible for the utilisation of glucose by insulin-dependent pathways.

Baskaran *et al.* studied the effect of extracts of *G. sylvestre* leaves in controlling hyperglycaemia in type 2 diabetic patients. The extract produced a significant reduction in blood glucose, glycosylated haemoglobin and glycosylated plasma proteins,

with a decrease in conventional drug dosages required. Some patients were able to discontinue conventional drugs and even maintain their blood glucose homeostasis with extracts alone. In insulin-dependent patients, prolonged administration of a water-soluble extract of leaves of *G. sylvestre* produced a reduction in insulin requirements, improved blood glucose homeostasis, better controlled hyperlipidaemia, and reduced serum amylase activity.

Among the spices, fenugreek seeds *(Trigonella foenumgraecum)*, garlic *(Allium sativum)*, onion *(Allium cepa)*, and turmeric *(Curcuma longa*) have been experimentally documented to possess antidiabetic potential. In a limited number of studies, cumin seeds *(Cuminum cyminum)*, ginger *(Zingiber officinale)*, mustard *(Brassica nigra)*, curry leaves *(Murraya koenigii)* and coriander *(Coriandrum sativum)* have been reported to be hypoglycaemic.

Trigonella foenumgraecum, (fenugreek seeds) have been reported to possess hypoglycaemic and hypolipidaemic properties in animal experiments, as well as in humans. Basil, *Ocimum sanctum* and *O. album* have been observed to decrease fasting and postprandial blood and urinary glucose levels in type 2 diabetic patients. The dried powder of these leaves also mildly reduced cholesterol levels.

Unfortunately evidence from well-conducted, rigorous human clinical trials is not sufficient to allow the comparison of traditional medicines with conventional drugs. There is also inadequate regulation of traditional remedies, particularly as their use is growing. Product standardisation, efficacy, safety and therapeutic risk/benefit trials are urgently needed. The increasing use of traditional medicines means that it is important that family practitioners keep abreast of developments in this field and, where possible, include traditional practitioners in the health care team.

Further reading

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IN A NUTSHELL

Diabetes mellitus is a chronic metabolic disorder in which every bodily cell is compromised by impaired access to essential nutrients.

The aim of treatment is to relieve symptoms, overcome ketoacidosis and catabolism, and restore nutrient reserves and natural resistance to infection.

About 80% of the people in Africa use traditional medicine.

The World Health Organization has recognised the contribution and value of herbal medicines used by a large segment of the world's population.

The is a vast amount of anecdotal evidence surrounding the efficacy of African remedies for various conditions including diabetes.

Traditional remedies may lead to successful medical treatments for a disease which is soaring in Africa in large part due to the ills of modern life, including urbanisation, processed westernised food and a lack of physical activity.