Herbal Medicines for Diabetes and Cancer—A Global Perspective

by Peter Natesan Pushparaj

Diabetes mellitus is a principal cause of morbidity and mortality in human populations. It is a syndrome characterized by hyperglycemia, polydipsia and polyuria and causes complications to the eyes, kidneys and nerves. It is also associated with an increased incidence of cardiovascular disease. The clinical manifestations and development of diabetes often differ significantly between countries and also between racial groups within a country. For example, diabetes currently affects an estimated 15.1 million people in North America, 18.5 million in Europe, 51.4 million in Asia, and just under one million in Oceania. It is estimated that globally, the number of people will rise from 151 million in the year 2000 to 221 million by the year 2010, and to 300 million by 2025. However, diabetes mellitus is becoming increasingly common in the Singapore population. The prevalence of type 2 diabetes doubled between 1984 and 1992 in Singaporean Chinese. This increase can be attributed to many factors, including a stressful lifestyle as well as improper dietary habits. This is of economic concern as the disease requires life-long treatment and associated with high morbidity from the resulting complications.

Introduction

Herbal remedies typically are part of traditional and folk healing methods with long histories of use. Some forms of the herbal medicines are found in most areas of the world and across all cultures historically. Before the advent of insulin, diabetes was treated with plant medicines. In 1980, the World Health Organization (WHO) urged researchers to examine whether traditional medicines produced any beneficial clinical results. The plant kingdom represents a largely unexplored reservoir of biologically active compounds not only as drugs, but also as unique templates that could serve as a starting point for synthetic analogs and an interesting tool that can be applied for a better understanding of biological processes. Folkloric uses are supported by a long history of human experience. Numerous biologically active plants are discovered by evaluation of ethnopharmacological data, and these plants may offer the local population immediately accessible therapeutic products.

The earliest known documentation of plant-derived treatments for diabetes is found in the Ebers Papyrus of about 1550 BC. Since then, multitudes of herbs, spices and other plant materials have been described for the treatment of diabetes throughout the world. Traditional anti-diabetic plants might provide a useful source of new oral hypoglycemic compounds for development as pharmaceutical entities, or as simple dietary adjuncts to existing therapies. However, since the availability of insulin, folklore medicines for diabetes have almost disappeared from occidental societies, although they continue to be the cornerstone of therapy in underdeveloped regions. Renewed attention to alternative medicines and natural therapies has stimulated a new wave of
research interest in traditional practices. In the last 20 years, scientific investigation has confirmed the efficacy of many of these preparations, some of which are remarkably effective. Mentioned hereafter are those plants that appear most effective, are least toxic and have substantial documentation of efficacy.

More than 400 different plants and plant extracts have been described for the diabetic patient. From these, various molecular species with hypoglycemic activity have been identified, including alkaloids, flavonoids, glycosides, and polysaccharides. For example, castanospermine, an alkaloid isolated from seeds of *Castanospermum australe*; epicatechin, a flavonoid isolated from the heartwood of *Pterocarpus marsupium*; and neomyrtillin, a glycoside isolated from *Vaccinium myrtillus* were claimed to exert hypoglycaemic effect.8 Like the sulfonylureas, some plants act by increasing the release of insulin and require a minimum of β-cells to exert their action. These plants include *Momordica foetida*, *Euphorbia prostrata* and *Fumaria parviflora*, *Taraxacum officinale* and *Eribotry japonica*. These plants include *Momordica foetida*,9 *Euphorbia prostrata* and *Fumaria parviflora*,10 *Taraxacum officinale*11 and *Eribotry japonica*.12 Some are shown to correct complications of diabetes, for example, masoprocol, a pure compound isolated from *Larrea indentata*, which decreases the elevated levels of serum cholesterol, free fatty acids and triglycerides in fat-fed diabetic rats.13 Even with the use of these herbs, which possess blood glucose lowering effects, proper and effective natural treatment of diabetics require careful integration of diet, nutritional supplements, lifestyle and botanical medicine.

Although many herbal remedies are claimed to have anticancer effects, only a few have gained substantial popularity as alternative cancer therapies. For decades, Essiac has been one of the most well-known herbal cancer alternatives in North America. It was developed by a Native healer from Southwestern Canada, it was popularized by a Canadian nurse, Rene Caisse (Essiac is Caisse spelled backwards). Essiac comprises four herbs: burdock, Turkey rhubarb, sorrel and slippery elm. Conversely, researchers at the National Cancer Institute of USA (NCI) and other institutes found that it has no anticancer property. Even though Essiac is illegal in Canada, it is widely available in American pharmacies and health food stores.14, 15

A derivative of mistletoe, called iscador, is a popular cancer remedy in Europe, where it is said to have been in continuous use as folk treatment since the druids. I scador is available in many mainstream European cancer clinics. European governments have funded studies of iscador’s effectiveness against cancer, but definitive data have not emerged.16–17

Pau d’arco tea is said to be an old Inca Indian remedy for many illnesses, including cancer. Made from the bark of an indigenous South American evergreen tree, its active ingredient, lapachol (2-hydroxy-3-(3-methyl-2-butenyl)-1,4-naphto-quinone), has been isolated. Although lapachol showed antitumor activity in animal studies conducted in the 1970s, it does not appear to affect
human malignancies. The tea does induce nausea and vomiting. Despite the absence of efficacy, pau d’arco tea is sold as a cancer remedy in health food stores, by mail, and on the internet.14

Herbal remedies in Asia show greater promise. For example, in Japan, several mushroom-derived compounds are approved for use as cancer treatments. PC-SPES (PC for prostate cancer; SPES is the Latin word for hope), a combination of eight herbs, all but two from traditional Chinese medicine, was found to reduce prostate-specific antigen (PSA) levels in men with advanced prostate cancer. The recipe came from a great-grandfather of one of the researchers, that ancestor having been a physician to the Chinese emperor. Estrogenic side effects occurred with PC-SPES, and its mechanism of action, although uncertain, may relate to its phytoestrogen effects.18–21

Chinese medicinal herbs (CMH) can improve chemotherapy treatment in lung cancer according to researchers at the Jiangxi Cancer Hospital, Nanchang. The researchers observed the effect of Chinese medicinal herbs (CMH) and chemotherapy on non-small cell lung cancer. Comparing the therapeutic effects of three treatment regimens on 110 patients diagnosed with advanced non-small cell lung cancer patients — 58 patients were treated with CMH plus chemotherapy, 28 cases treated with chemotherapy only and 24 cases treated with CMH alone. The results showed that the effective rates (i.e. partial remission or complete remission) were 22.9% in CMH and chemotherapy (CT) group, but just 13.6% both in chemotherapy and in the CMH group. The survival rate of both the CMH and chemotherapy group and the CMH group were significantly higher than that of the chemotherapy group but there were no significant differences between CMH and CMH + CT group. The researchers concluded that Chinese medicinal herbs were helpful to improve average survival times and survival rates of patients with advanced non-small cell lung cancer. The herbs could be used in conjunction with chemotherapy and the evidence suggests that they may be equally effective used alone which would mean that patients may be able to avoid the side effects of chemotherapy treatment.22

A study developed by researchers at the University of California at San Francisco Breast Cancer Center involves patients from that institution and from the Memorial Sloan-Kettering Cancer Center. Women with advanced metastatic breast cancer, receiving a Tibetan herbal formula, are being followed for clinical outcome, including survival. These investigations suggest that historic herbal cancer remedies, pre-tested to insure purity and consistency of product and studied carefully, may produce potentially useful, non-toxic cancer treatments. The difficulty with time-honored herbal remedies is that they are rarely tested for purity, examined for consistency, or studied carefully. They are, nonetheless, in common use. Herb sales in drugstores and food stores increased 35% from 1993 to 1994, totaling US$106.7 million for the year.23

Vinca rosea
(Family: APOCYNACEAE, Common Name: Rosy Periwinkle)

It is also known as Madagascar periwinkle. Madagascar periwinkle’s traditional use as a treatment for diabetes has led to extensive investigation into its properties. Vincristine and vinblastine are powerful anticancer agents, and are two of the most important medicinal compounds found in plants in the last 40 years. Vincristine has proved most effective in treating childhood leukemia; vinblastine in treating testicular cancer and Hodgkin’s disease (cancer of the lymphatic system). Like many drugs used in chemotherapy, both alkaloids produce side-effects as nausea and hair loss.

Long before modern researchers learned of the plant’s valuable and varied properties, folk healers in faraway places were using the Madagascar periwinkle for a host of medicinal purposes. In India, they treated wasp stings with the juice from the leaves. In Hawaii, they prescribed an extract of the boiled plant to arrest bleeding. In Central America and parts of South America, they made a gargle to ease sore throats and chest ailments. In Cuba, Puerto Rico, Jamaica, and other islands, an extract of the flowers was commonly administered as a soothing eyewash. Periwinkle is used in folk medicine in the Philippines as a remedy for diabetes. Most of these practices are still followed.
Safety and Regulatory Issues on Herbal Medicines

No legal standards exist for the processing or packaging of herbs. Quality-control standards and reviews are needed. Because they are not mandatory, however, few food supplement companies voluntarily self-impose quality evaluation and control. Consumer protection and enforcement agencies cannot provide protection against contaminated or falsely advertised products. Current federal regulations do not permit such oversight, and regulatory capability would prohibit full analysis and ongoing oversight of the estimated 20,000 food supplement items now sold over the counter. Cancer patients use over-the-counter herbal products in addition to or instead of those promoted specifically as cancer treatments. It is therefore important to recognize herbal remedies that may help cancer patients and those that are toxic or interact with other medications. Because neither the US Food and Drug Administration (FDA) nor any other agency examines herbal remedies for safety and effectiveness, few products have been formally tested for side effects or quality control, but information is beginning to emerge on the basis of public experience with over-the-counter supplements.

Recent reports emphasize the fact that “natural” products, contrary to apparent consumer belief, are not necessarily safe or harmless. Most members of the public apparently are not well aware that herbs are dilute natural drugs that contain scores of different chemicals, most of which have not been documented. Effects are not always predictable. Moreover, the potential for herb-drug interactions is sufficiently problematic that patients on chemotherapy should be told to stop using herbal remedies during treatment. Similar cautions are necessary for patients receiving radiation, as some herbs photosensitize the skin and cause severe reactions. Patients scheduled for surgery should be alerted to the fact that some herbs produce dangerous blood pressure swings and other unwanted interactions with anesthetics. Herbs such as feverfew, garlic, ginger and ginkgo have anticoagulant effects and should be avoided by patients on coumadin, heparin, aspirin, and related agents. The risk of herb-drug interactions appears to be greatest for patients with kidney or liver problems.

Moreover, botanical remedies are sold in many forms, including capsules, liquids and tea leaves. They may contain one or a collection of herbs and other ingredients, which typically are not described and often are unknown. According to research conducted by Consumer Reports, the content of herbal remedies often differs widely from one bottle to the next, even within the same brand, as well as from claims made on the label. The California Department of Health found unsafe levels of mercury and other toxic metals in more than a third of Asian patent medicines studied. Several instances of heart problems resulting from digitalis-contaminated supplements have been reported. Concerns have been raised recently even about dietary antioxidants,
which may interact with chemotherapeutic agents. Hence, Canada is establishing a federal office to evaluate and regulate herbal remedies, which they will treat as a new category distinct from drugs and foods. Organizations such as the American Medical Association and the American Cancer Society have produced position papers, and hearings have been held on food supplement issues by the FDA.

In conclusion, the enormity and seriousness of the problem probably will lead to the establishment of government programs, despite the anticipated efforts on the part of the food supplement industry to block efforts that could lead to regulation of herbal products.

References
Dr Peter Natesan Pushparaj is currently teaching at the Department of Biochemistry, Faculty of Medicine, National University of Singapore, Singapore. He has extensive experience in teaching Biochemistry. His research has cast new light upon the anti-diabetic properties of Averrhoa bilimbi. Dr Pushparaj has identified and characterized the active components, nicotinic acid (NA) and magnesium (Mg) in A. bilimbi which is believed to improve the blood glucose tolerance in diabetes. He has published scientific articles in many international journals and a book chapter in Herbal Medicines: Molecular Basis of Health and Disease (published by Marcel Dekker Inc., August 2004).

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