Use of Plants for Medicinal Purposes

by

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Introduction

There are two main systems of medicines practised in Sri Lanka. They are the traditional systems and the Western or the allopathic system. A recent survey by the World Health Organization has revealed that about 70 per cent of the Sri Lankan population depends on the traditional systems of medicine. Four systems of traditional medicine have been adopted in Sri Lanka. They are the Ayurveda, Deshiya Chikitsa, Siddha and Unani. Of these, genuine Ayurveda and Deshiya Chikitsa systems use mainly plant and herbal preparations for the treatment of diseases - the former uses about 2000 plant species, the latter uses about 500 species.

A traditional medical practitioner or a 'Vedamahatmaya' would admit with no hesitation that his 'cures' which consist of preparations like 'arishta', 'kasaya' (decoction); 'guli' and 'kudu' contain more than 90% of material derived from plants. On the other hand, if you were to ask a doctor practicing western medicine, whether he prescribed any preparation of plant origin , he would probably answer that nowadays everything comes out of a test-tube. Is this true? You would almost certainly be amazed to learn that in 1964, almost 50 per cent of all the prescriptions written in the United States of America contained a drug of plant origin, either as the sole ingredient or as one of the two main ingredients. In addition, if the general term natural products

include all those plant extracts from which drugs such as the steroids are prepared, then the percentage of natural products used in medicine is very much higher.

Plants, Why are they so useful to man

I am certain you would agree with me that the plant kingdom makes many more contribution to us than the animal kingdom, even though the total number of plant species on the earth is only one twenthieth of the total number of animal species available. It is estimated that there are 250,000 plant species on the earth in contrast to at least 5 million animal species. Let us ask the question 'Why is this disproportionate contribution?'.

Plants, being stationary, have a difficult time 'keeping away threats' from their environment in the form of plant-eaters, too much heat or too much cold, too much water or not enough water etc. An animal can cope with these problems by simply walking, crawling, swimming, or flying away from the scene. A plant, on the other hand, must fight its battle when it grows. So a plant's survival strategy lies in the chemical compounds it produces in its tissues in order to cause indigestion for herbivorous animals, insects etc. and in order to help it through times of stress from heat, drought and other adverse conditions. Indeed a plants' life is one long struggle to overcome difficult problems. During such adaptations, plant kingdom had to produce an extraordinary array of biocompounds (phytoconstituents) of an abundance and diversity. These biocompounds are especially produced in plant communities that live in areas of 'biological warfare', notably in areas with climatic extremes such

as deserts and rain-forests. In deserts, plants have to deal with a hostile environment, and in rain forests they have to deal with exceptional competition from huge numbers of species crowded into relatively small areas. When scientists go in search of specialized chemicals in the plant kingdom, they often head for arid lands and jungles.

History of Use of Plants for Medicinal Purposes

Let us see how over the centuries plants have made some important contributions to medicine. One can readily imagine that primitive man soon started to experiment with plants that grew all around him and watched the feeding habits of animlas on these plants in an attempt to select plants to treat injuries or to cure diseases. During the centuries that followed, he made his trials and his errors and gradually a number of worthwhile remedies were discovered.

Probably the earliest of all recorded medicines was the plant MaHuang. This plant was first described by the Chinese Emperor Shen Nung 4750 years ago (2760 B.C) as a remedy for coughs and also as a cardiac stimulant. The active principle isolated from it called ephedine was introduced into European medicine in 1926. It is now mainly used for treating asthma although it could still be used for those purposes Chinese Emperor Shen Nung suggested, if it were not that more specific drugs are now available.

During the Middle Ages (11th to 18th century) the widely accepted dogma that nature herself provided a cure for every disease added the incentive to the search for medicines amongst the plant kingdom.

It was commonly believed that the 'signature' of a disease was impressed upon the plant which could cure that particular disease. Plants with red flowers were used to prevent bleeding, and those coloured yellow were supposed to cure jaundice. The wrinkled kernal of the nutmeg was thought to resemble the brain and so nutmeg was used to treat mental diseases. The serpent shape of Rauvolfia (Sinhala- Ekaweriya) root commonly called snake-root indicated that it should be useful in treating snake bite. The worm shaped embryo of chenopodium or worm seed suggested it to be of value as an anthelmintic.

Obviously, no rational justification for the use of plants in medicine selected in this manner could be made. However, as man experimented, he found by trial and error, certain plants useful for the treatment of a large number of illnesses. Many of the uses of these plants were in the course of time documented in various books on medicinal botany, ola-leaf manuscripts and materia medica. The latter two form the basis of our Ayurveda and Deshiya Chikitsa systems. According to the two oldest Sinhalese works, Mahawansa and Dipawansa, Kind Buddhadasa who reigned in Anuradhapura between 330 to 400 A.D. was said to have performed medical wonders with herbs. It is due to the pioneering work of our ancient noble kings that the Ayurvedic medical system owes its existence in Sri Lanka.

The Contribution of Plants to Modern Medicine

It is indeed unfortunate that for many centuries very little emphasis has been placed on the scientific aspect of studies on medicinal plants. As late Dr. John Attygalle has wisely pointed out in his compilation of Sinhalese Materia Medica published in 1917 "it is much to be regretted that practitioners of Western Medicine in Ceylon have paid so little attention, if any, to the many useful drugs employed by our native medical men"

The importance of plant derived drugs in modern medicine is somewhat underestimated. Such useful drugs as quinine (anti-malarial) reserpine (anti-typertensive), vincaleukoblastine (anti-leukaemia), ephedrine (anti-asthmatic) - to mention only a few - present a broad spectrum of medicinal products isolated from plants. In addition to these purified drugs, the crude drugs derived from plant sources (e.g. crushed dry leaves of foxglove - Digitalis purpurea used as a treament for heart failure) are also utilized by some physicians practising western medicine. Most of these drugs were discovered as a result of the painstaking research of organic chemists and perceptive physicians who believed that there could be some truth in many of these seemingly 'folkoric wonders'. They were the first to admit that 'jungle lore' may lead to medical triumphs.

For over twenty centuries Western Science ignored medical claims about a certain medicinal plant from India. This plant once known only to medical men and peasants in India is nowadays used in over 40 million prescriptions annually is none other than the snake root plant which I mentioned above. The crude Indian drug derived from

Rauvolfia serpentina consisted only of a powder ground up from the dried root. For centuries Indian physicians used this to treat mentally sick patients. Rauvolfia did not become front page news until 1952 though 45 years had elapsed since its recognition by the Western World. Chemical and Pharmacological investigation led to the isolation of the active principle of Rauvolfia, an alkaloid called reserpine. Reserpine could be considered as the most valuable tranquilizing drug ever to come from the 'world of plants'.

Another plant belonging to the same family of plants as Rauvolfia, namely Apocynaceae or dogbane family is Madagaskar periwinkle or Catharanthus roseus. It is a weed found growing extensively in cemetries. Hence the Sinhala name 'mini-mal', In Tamil it is called 'patti-poo'. In Ayurveda, the water extract of mini-mal flowers is used for the treatment of diabetes. Extensive investigations into the long claimed hypoglycaemic (anti-diabetic) properties led to the accidental discovery of its tumour inhibitory property. To the surprise of those involved in cancer research one of the mini-mal alkaloids (vincaleukoblastine) was found to be highly active against leukaemia, especially in children.

Ekaweriya and mini-mal are two examples of plants which directly produce useful drugs. There are other plants whose products could chemically be trnasformed into pharmaceutically useful compounds. One such example is Dioscorea (Sinhala - Kodol, Wal-ala) whose yams yield a steroid derivative which could be converted into sex hormones, especially cortisone and hydrocortisone. Cortisone is a hormone secreted by the outer envelope (cortex)of the adrenal gland. Cortisone and its

'chemical relatives' are used in the treatment of a large number of diseaes. In rheumatic heart disease and in a dozen of other afflictions, these steroid drugs are either life-saving or life-prolonging. They are also anti-inflammatory and that is why they are useful in temporary flare-ups of arthiritis. Some analogues of cortisone are also used in treating certain skin diseases.