MULTIPURPOSE INDIGENOUS SPECIES FOR MEDICINAL USE

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The knowledge of materia medica preserved in different types of indigenous medical systems is very large. Ethno pharmacology is the subject which go deep into the science of materia medica of different ethnic groups. Ayurveda, the ancient science of healing speaks a great deal about the use of different species of plants with varied uses. Enormous literature is found in the ancient texts about the habitat, methods of cultivation, manuring and other uses such as food, medicine or ornamental.

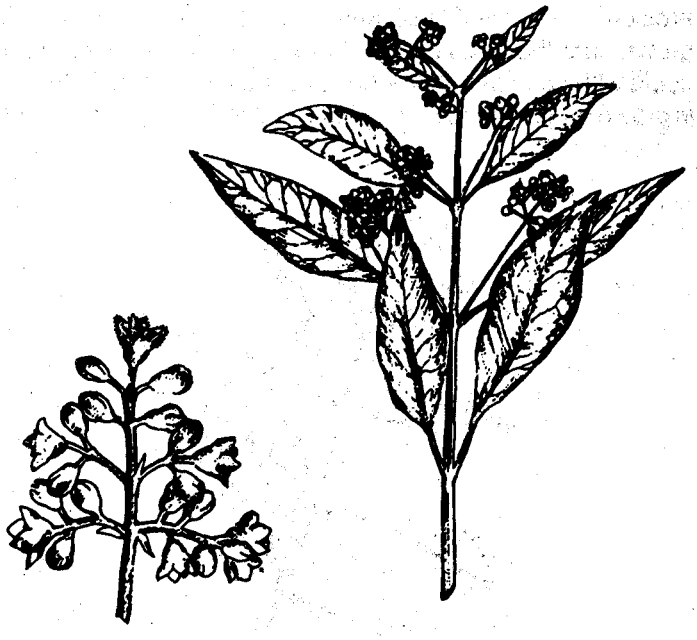
There is a big threat to these plants as the public is unaware of their medicinal values or otherwise. It is our duty to educate them show how money could be earned by growing medicinal plants, besides other uses such as timber, fodder, manure, ornamental, effects on environment etc. This will enable them to protect them from extinction.

The following indigenous species are extensively used in Ayurvedic medicine but due to their inadequate supply some are yet imported from India incurring much valued foreign exchange. Growing of these species will provide self employment opportunities, while the drug manufacturers could get quality raw materials, with many other accrued benefits of the people. The important multipurpose species are: *Santalum album, Terminalia arjuna, Madhuca longifolia, Woodforlia fruticosa, Acorus calamus, Abrus precatorius, Solanum xanthacarpum, Nelumbo nurifera, Plumbago zeylanica, Tinospera cardifolia, Azadiracta indica, Aloe vera, Adhatoda vasica, Hibiscus abelmoschus, Saraca indica.*

***Santalum album* L.**

Family	:	Santalacea
Sanskrit Name	:	Chandana
Sinhala Name	:	Sudu Handun

Small evergreen tree grows wild or are cultivated in Mysore, State and Coorg, Coimbatore in South India and in Haputale and Welimada area in Sri Lanka. Parts used in medicine are wood, volatile oil and leaves.



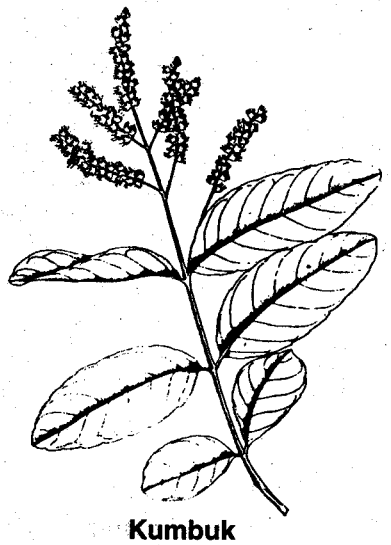
Sudu Handun

Wood is bitter, cooling, sedative and astringent. Oil is astringent and disinfectious to the mucous membranes of the genitourinary and bronchial tracts, also diuretic, expectorant and stimulant. Medicinally Sandal Wood is useful in biliousness, fever and thirst, applied externally in the form of a paste with water or rose water to scorpion stings, inflamed swelling, to prickly heat and skin eruptions, to the temples in headaches, fevers and hemicrania and to skin diseases to allay itching, inflammation, heat and pruritis. It is used to check gastric irritability, dysentery and relieves excessive thirst and heat of the body. Sandal Wood oil is a popular remedy in gonorrhoea, chronic cystitis, bronchitis, gleet and urethral haemorrhage. Leaves are used as a vegetable. It could be a shade tree in the tea plantation. Birds like the fruits. They will prey on other insects too. Oil is extracted from the hard wood and root. It is extensively used in medicine and perfumes. Large scale growing can be done in the Uva province.

***Terminalial Arjuna* Wight & Arn**

Family : Combretaceae
Sanskrit Name : Arjuna
Sinhala Name : Kumbuk

A large tree grows near water ways. The bark and leaves are used as medicine. A herbal wine 'Arjuna Arishta' is made from the bark. The bark is astringent, cardiac stimulant, tonic, lithotropic. The decoction is used in diarrhoea, haemorrhage and used as an antidote to poison. It is used in endocarditis, pericarditis, angina and in ulcers. Bark contains tannin, a colouring matter, a glucosidal and ash, containing sodium, pure calcium carbonates and traces of alkaline chlorides. Could be grown on the sides of rivers and water ways to check erosion. It is believed that Arjuna root purifies the water. It is grown near the wells by the villagers. It is a hard tree which could withstand serve droughts, floods and winds. In India it is grown as a road side tree. Wood is used as a quality timber.



Kumbuk

***Madhuca longifolia* (L) J.F. Macbr**

Family : Sapotaceae
Sanskrit Name : Maduka
Sinhala Name : Mee

A large beautiful evergreen tree grows in dry zone and wet zone. The bark, leaves, flowers, seeds and seed oil are used in Ayurvedic medicine. Oil is edible. Still many people, in the North Western and North Central provinces use Mee oil for their day to day cooking. The oil cake is also used in medicine. The tender leaves, bark and oil is used extensively in the treatment of fractures and dislocations. The flower buds and flowers contain a high percentage of honey. Bee colonies can be kept if this tree is present in abundance. The flowers are used in herbal wines. It is a beautiful tree with hard wood and can be used as an ornamental plant in large gardens. Good as a roadside tree. It attracts bees during flowering seasons. Birds and bats love the ripe fruit. This is the only mode of propagation. "Maduka Pana" fruit juicementioned in Buddhist literature is nothing but the juice of ripe fruit. It tastes as Avacado cream. More consideration should be given to grow this tree in reforestation and as a road side tree.

Ayurveda, the ancient science of healing speaks a great deal about the use of different species of plants with varied uses. Enormous literature is found in the ancient texts about the habitat, methods of cultivation, manuring and other uses such as food, medicine or ornamental.

***Weedfordia fruticosa* (L) Kurz**

Family : Lythraceae
Sanskrit Name : Dhataki
Sinhala Name : Malitha Mal

A large shrub which grows on the bill slopes of Haputale and Uva province. The bright red flowers are used in medicine. The flowers are mulant, astringent and tonic. Infusion of flowers and leaves is used as tea. Flowers are added to prepare Arishta and Asava (Herbal wines) of alcoholic fermentation. These flowers check the fermentation after producing alcohol between 6% to 8% in the herbal wine. The flowers are used in dysentery, diarrhoea and other chronic bowel complaints. The decoction of flowers is used in chronic ulcers. This shrub could be grown on tea estates to check erosion in the slopes. It is a hard plant which will withstand severe drought. The nectar of the flowers is much loved by many birds especially the Gira Mallitha, a vanishing species. At present the entire requirement is imported from India. In 1990 Sri Lanka has spent Rs. 510404/= to import 28250 kg of Malitha flowers.

***Acorus Calamus* Linn**

Family : Araceae
Sanskrit Name : Vacha
Sinhala Name : Vada Kaha
Tamil Name : Vasambu

A sent aquatic perennial. Part used is the dried rhizome. A volatile oil could be extracted which contains achorion another principle acoretion, calamine, mucilage and a little tannin. The root and rhizome are stimulants, emetic, stomachic, expectorant, carminative, antispasmodic and nervine sedative. In large doses (30 to 40 grams) it produces a violent and persistent emesis. It is extensively used in mental diseases. It is used in dyspepsia, flatulence, loss of appetite and in neuralgia. It can be grown in paddy fields in crop rotation. It needs very little water. It grows well in the Uva, North Central and North Western provinces. Almost all the requirements for the manufacture of Ayurvedic drugs are still imported from India. In 1989 Sri Lanka has spent Rs. 543575.08 to import 16000 kg of dried Wada Kaha rhizomes.

***Abrus Precatorius* L.**

Family : Leguminosae
Sanskrit Name : Gunja
Sinhala Name : Madatiya

A large ever green grown in Wet Zone and Dry Zone. Bark, seeds and leaves are used in medicine and the seed contains poisonous proteins and an albuminous substance called Abrin. Seeds are purgative emetic, tonic, antiphlogistic and aphrodisiac. Abrin is a very powerful irritant, produces oedema and skin irritation. Still the seed is used as a unit of measurement. Root and bark is used in medicine for cough, fractures and dislocations. The tree bears green leaves during the most dry seasons of the year. The leaves can be use as animal fodder. The leaves are used as manure. This tree can be grown as a road side tree. Leaves are used in hair oils such as Neelyadiya and Sarva Wishadiya.

***Solanum virginianum* L.**

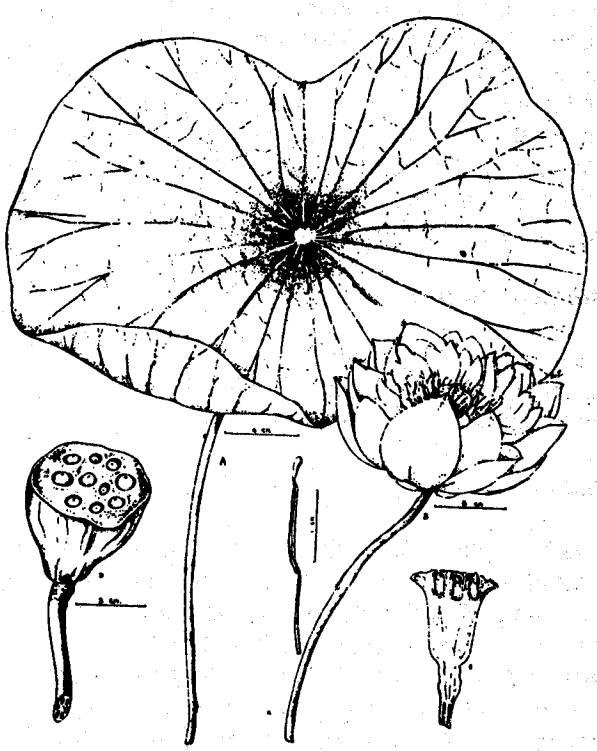
Family : Solanaceae
Sanskrit Name : Kantakari
Sinhala Name : Katuwelbatu

A periminal at one time it grew as a weed but now millions worth of Solanum virginianum is imported from India. It can be grown easily in the Dry Zone. The whole plant is used in medicine. The drying technique is still not known to the local people. The plant is used as an effective diuretic, expectorant and febrifuge and in fever, cough asthma and other lung disorders. In 1990 Sri Lanka has spent Rs. 2472044.59 to import 208650 kg of Katuwalbatu.

***Nelumbo nucifera* Gaertn**

Family : Nymphacaceae
Sanskrit Name : Kamala
Sinhala Name : Nelum

This large aquatic herb is generally grown in all parts of Sri Lanka in tanks and ponds. The entire plant is used in medicine. Rhizome and the seeds are edible. The rhizome and seeds contain resins, glucose, metarbin, tannin, fat and an alkaloid Nelumbine. The seeds are demulcent and nutritive; stamens and flowers are cooling, sedative, astringent, cholagogue, diuretic, bitter, refringent and expectorant. Seeds are edible. They are used in diarrhoea, liver diseases, fevers and as a cardiac tonic. Honey formed in the flowers is called Padama Madhu or Makaranda. This is used in eye diseases. Syrup of flowers is used in cough, to check haemorrhage from bleeding piles and in haemorrhage. Rhizome contains a large proportion of fibres and therefore it is good in piles, constipation, chronic diarrhoea and malabsorption syndrome. It maintains bowel hygiene. Seeds are used as an application in skin diseases. India, Thailand, China, Korea, Japan and many far Eastern Countries grow lotus extensively in low lying areas for food and medicinal purposes. Some of these countries cultivate lotus in rice fields in rotation with rice. Lotus can be grown with little water. The lotus is a sacred flower to the people of Egypt, India, China and Sri Lanka. It is also the national flower of India.



Nelum

***Plumbago zeylanica* Linn**

Family	:	Plumbaginaceae
Sanskrit Name	:	Chitraka
Sinhala Name	:	Ratnitul
Tamil Name	:	Chittira

A garden plant which bears beautiful red flowers. The outer covering of the root is used as medicine. The root is poisonous. It has to be treated before using. The root has a beneficial effect on piles. It is used for dyspepsia, anorexia, rheumatism, epilepsy and otehr mental disorders. It is used in many herbal wines. Root and bark is used in an external application in Leucoderma. It causes irritation of the skin. This too is imported from India. It could be easily propagated with stem cuttings and bears a good yield.

Tinosper cardifolia

Family	:	Menispermaceae
Sanskrit Name	:	Guduchi
Sinhala Name	:	Rasa Kinda
Tamil Name	:	Shindil Kodi

A large creeper. The stem and the leaves are used in medicine. Berberine is extracted from the stem. This creeper is also used in large quantities in Ayurvedic medicine. There is a scarcity because it is used so abundantly. It is used in fevers, biliary conditions, jaundice, urinary infections, skin diseases, urticaria and inflammations. It is used as a home remedy. Decoction of Tinospera and Phyllanthus emblica (Nelli) is a very common drink to cool the body. It brings down hypertension, excessive sweating and rheumatic pains. Rasa Kinda the flour of is also used in medicine. It is a very common medicine in Ayurveda. The leaves are used as a mallum and the juice of the leaves is used in Kola Kenda (Herbal porridge). This could be cultivated in every garden.

Azadirachta Indica

Family	:	Meliaceae
Sanskrit Name	:	Nimba, Ravipriya
Sinhala Name	:	Kohomba

Habitat

Grows throughout Sri Lanka but grows wild in the Dry Zone. A large ever green tree. Every part, is the bark, root bark wood, seed oil, fruits, flowers, leaves and gum is used as medicine. The bark exudes a bright amber coloured gum. Seeds contain about 10-31% of yellow bitter fixed oil. Bark, root and seeds are astringent, tonic and antiperiodic and vermifuge. The fruit is purgative, emollient and anthelmintic, used in skin diseases. Margosa is used by almost all the systems of medicine. It is used in fever, general debility, convalescence after fevers and loss of appetite. Oil is used in urticaria, eczema, crysipiles, skin diseases like ring worm, scabies, pemphigus etc. The oil is used by local veterinary physicians for ulcers and many diseases of cattle and goats. The oil is used in the toilet soap industry. Hindus consider the tree as sacred and when planted is advantageous to health as a prophylactic against many diseases. Dried leaves are used as a herbal tea with a pinch of bitter taste for diabetic patients. The bed made out of the wood of Margosa is considered to be good to sleep on for people who suffer from chronic obstinate skin diseases. Chinese and Indians believe that the Margosa tree words off evil spirits and cleans the environment. It is a good species as a road side shade tree. It needs very little water and can withstand the heat and the disturbances on the highways. Parrots and other birds like the ripe fruit. Many birds make nests in the hollows of the trunks of large Margosa trees.

***Aloe vera* Linn**

Family	:	Liliaceae
Sanskrit Name	:	Gritha Kumari
Sinhala Name	:	Komarika

There are many varieties. Some grow wild. It grows well in hot dry climates in sandy soil. The jelly like substance inside the leaves is used as medicine. The dehydrated jelly is called Titta Abin. It is also used in medicine. The juice is cooling and cathatic; used in burns, ulcers and in liver and spleen diseases.

It is stomachic in small doses and in large doses purgative. It acts as an emmenagogue and anthelmintic. It is used in various eye disorders and cough. A herbal wine known as Kumari Asavaya is made from the juice. It is used as a cosmetic and nowadays it is used extensively in shampoos and facial creams. Juice is used in making natural beverages. It is sold in cans in Japan and Taiwan as a natural beverage. This beverage is recommended to chronic alcoholics. This has a regenerative effect on the liver. Therefore it is used in jaundice.

***Adhatoda vasica* L**

Family	:	Acanthaceae
Sanskrit Name	:	Vasaka
Sinhala Name	:	Pavatta

The plant (bush) grows in all parts of Sri Lanka. It could be easily grown and withstands hard climatic conditions. The entire plant is used in medicine. The roots, leaves and flowers are extensively used in many preparations. They are used as expectorant, diuretic, antispasmodic and alterative. In chronic bronchitis, cough is relieved and the sputum is loosened so that it is brought up more easily. Decoction of the whole plant is used in fever, coryza, cough and other lung disorders. This

plant is made use of in different ways in many home remedies. Can be grown on hedge and as a fence. It is a plant that should be always kept in a home garden. There is a great demand in the local drug market.

***Abelmoschus moschatus* Medic**

Family : Malvaceae
Sanskrit name : Latha Kasturi
Sinhala Name : Kapukinissa
Tamil Name : Vathilai kasturi

A common plant through out India. Grows well in Sri Lanka. Parts used are seeds, root and leaves. The seeds are used as medicine. It is used as a substitute for musk. The seeds are known in European trade as grains of ambrette. In medicine they are useful in nervous debility, dyspepsia and lung disorders. They are also used in perfuming medicinal oils. A strong useful fibre is made from the stem of the plant. Though it could be grown in Sri Lanka still a large quantity is imported from India. Seeds are used in the preparation of tincture musk. Essential oil from the seeds is used in the perfume industry. In 1990 Sri Lanka has spent Rs. 79706 worth foreign exchange to import 1576 kg of Kapukinissa seeds.

***Saraca indica* Linn**

Family : Leguminosae
Sanskrit Name : Asoka
Sinhala Name : Asoka

A tree 6.9 m high. Distributed India, Sri Lanka and Malaya. The bark is used as medicine. Many substitutes and adulterants are used as there is a great scarcity. Up to now it is not grown as a commercial product. It is used in Ayurveda in a variety of disease conditions such as fatigue, tumour, enlargement of the abdomen, colic, haemorrhoids, ulcers, discharge from the uterus. The bark is used in uterine fibroids, bleeding, haemorrhage and dysentery. It bears beautiful flowers and is used as an ornamental tree. Hindus believe it as a sacred and auspicious tree to be kept in the garden. This tree can be grown on a large scale as a commercial product. There is a great demand for the bark.

In 1990, Sri Lanka had spent to import

*** Rs. 5,10404.00**	**-**	**28,250 Kg of Malitha flowers.**
*** Rs. 5,43,575.08**	**-**	**16,000 Kg of dried Wada Kaha rhizomes**
*** Rs. 24,72,044.59**	**-**	**2,08,650 Kg of Katuwalbatu**
***Rs. 79,706.00**	**-**	**1576 Kg of Kapukinissa seeds**

SOME CHEMICAL CONSTITUENTS OF MEDICINAL PLANTS

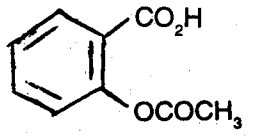
Dr. S.I. Samarasinghe
Senior Lecturer
Department of Chemistry, University of Sri Jayewardenepura, Nugegoda.

The use of plants and parts of plants such as leaves, root, bark seeds etc., as remedies for various ailments and diseases that afflict man, is almost as old as mankind. Man's curiosity to examine his environment by trial and error led him to discover which materials provided food and nourishment, which substances were toxic and which ones gave him relief from pain.

The use of plants as curative agents has over the years established distinct systems of medicine. The allopathic or Western system of medicine has developed through the advancement of science while some of the ancient practices remained in the hands of traditional healers. The ancient, methods of treatment developed into Ayurveda, Sidda, Unani, Chinese and other traditional systems of medicines.

Plants by far were the main source of all drugs until the development of synthetic drugs during the last century. Chemists have investigated plant extracts in their search for active compounds, leading to the development of new drugs.

It is interesting how scientists in the early days, explored nature and unravelled its secrets by discovering the medicinal value of plants. It is believed that Hippocrates, who is considered the father of modern medicine used medicinal plants. The white willow (salix) is one such plant. As far back as 1700 salix has been used in the form of a decoction as a remedy for fever. However, it was more than a century later that a French chemist by the name of Leroux extracted the active substance from the bark of salix. This substance was called "salicin" and was used a pain relieving agent (analgesic). Many derivatives of salicin were prepared and much later in the 1890's Bayer, a German Company launched a new product - acetylsalicylic acid. This product was marketed as "Aspirin", which is today a household name and the world's most widely known medication.



Aspirin (Acetylsalicylic acid)

Chemists have characterized and identified many active substances from plant extracts, some of which have led to the development of valuable drugs. Most of the active substances belong to the following chemical classes of compounds:

1. Alkaloids,
2. Terpenes,
3. Steroids,
4. Phenolic substances,
5. Cardiac glycosides.

The Alkaloids

These are substances containing nitrogen, and widely distributed in plants. Their physiological effects were discovered by many ancient peoples much before Organic chemistry developed.

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Quinine, which is an alkaloid, is one of the major active constituents of the bark of the cinchona tree. As far back as 1639 it was known developed much later. To serve as a commercial source of the drug, cinchona trees were cultivated in the Dutch East Indies. Examples of other alkaloids obtained from plants are:

Nicotine - (a stimulant, increases blood pressure); from the tobacco plant

Cocaine - (a powerful anaesthetic and stimulant); from coca leaves

Berberine - (paralytic effect, increases blood pressure); from barberry root

Morphine, codeine - (pain killers, toxic unless taken in small doses, habit forming); from poppy seeds

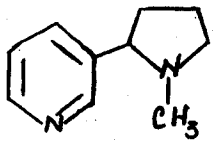
Piperidine - from black pepper

Reserpine - (for hypertension, nervous and mental disorders); from *Rauvolfia serpentine*

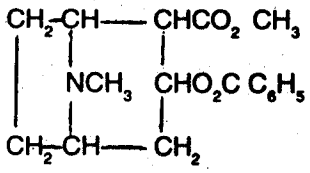
Vincristine, Vinblastine - (used in the treatment of leukaemia); from *Catheranthus*

Many valuable drugs have been developed in the West from Sri Lankan medicinal plants such as *Rauvolfia serpentine* (Ekaweriya) and *Catheranthus roseus* (Minimal). *Catheranthus* is also known as the rose periwinkle. It grows wild on waste land and is often found growing in cemeteries; hence the Sinhalese name Minimal. Unknown to many, much research has been carried out on the properties of its alkaloids, two of which are used in the treatment of leukaemia - vincristine and vinblastine. Most of the medicinal plants used in Ayurveda contain alkaloids
eg. *Adathoda vasica, Solanum xanthocarpum* (Katuwelbatu).

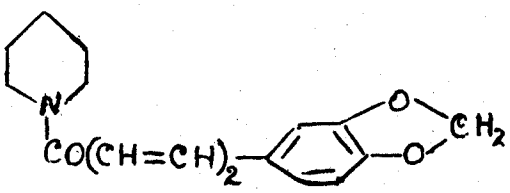
All alkaloids are bases containing nitrogen, but they exhibit a wide variety of structural features:



Nicotine



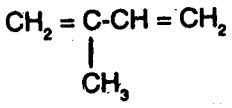
Cocaine



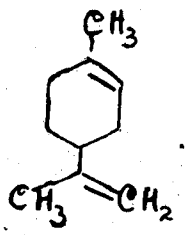
Piperidine

Terpenes

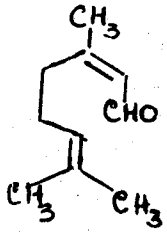
These compounds present in plants are based on the C5 unit, isoprene:



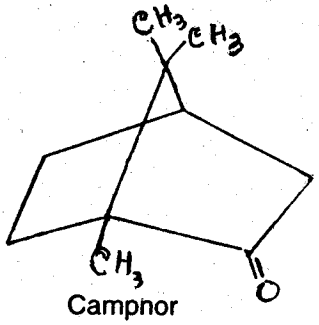
Mono terpenes contain two of these units, sesquiterpenes three, diterpenes four, triterpenes six and tetraterpenes eight units. Camphor, a monoterpene has medicinal properties. *Vernonia cinerea* (Monarakudumbiya) and *Azadirachta indica* (Kohomba) are two other plants that contain these compounds.



Limonene (lemon, orange)



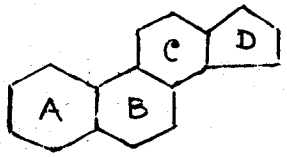
Citral (oil of lemon grass)



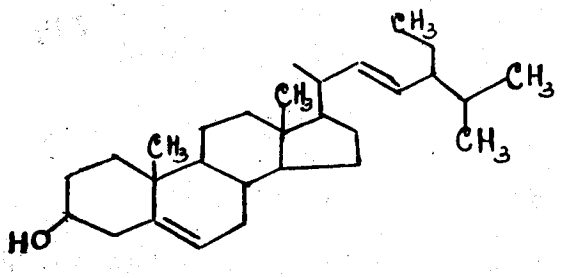
Campnor

Steroids

Steroids have the following ring system in their chemical structure:



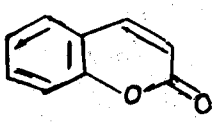
They bear a close structural relationship to the triterpenes. Many plant constituents are sterols. eg. stigmasterol, setoserol, cholesterol etc. Diosgenin from the plant *Dioscorea deltoidea* is the main raw material for the production of steroid hormones.



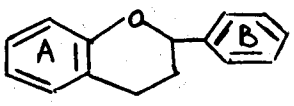
Stigmasterol

Phenolic compounds

A large number of phenolic substances occur in plants: Eg. phenolic acids, flavonoids, coumarins, anthocyanins. These have been identified in plant-extracts showing biological activity.



Coumarin



Ring system in Flavanoids

It is important for the youth of our country to realize the vast potential of our natural resources, to safe guard our heritage and improve the quality of life. Preserving and protecting our flora is one step towards achieving this goal.

Cardiac glycosides

These compounds possess the property of causing the heart muscles to contract. In small doses these are used in the treatment of cardiac problems. These occur as glycosides in purple foxglove- eg. digitoxigenin, digoxigenin.

Also present in plants are nutrients such as carbohydrates, vitamins, minerals, aminoacids, proteins, fattyacids, and lipids.

Chemists have isolated and identified many of the constituents of medicinal plants through phytochemical studies and advanced analytical techniques. The activity of these substances have been determined by various bioassay methods. Some of which are specific to the activity eg. antiulcer, antidiabetic.

New compounds identified from plants have been usually named after the plant source as seen in Table 1, which lists some of the chemical constituents of Sri Lankan medicinal plants.

Scientists have investigated the chemical constituents and the activity of several medicinal plants used in Ayurveda. Some plants used in Ayurveda and the indigenous system of medicine in Sri Lanka and their chemical constituents are listed below.

TABLE 1: SOME CHEMICAL CONSTITUENTS PRESENT IN MEDICINAL PLANTS.

Name of the Plant	Some Important Chemicals Constituents
1. *Adathoda vasica* (Adathoda)	vansicine, vasicinone
2. *Hemidesmurs indicus* (Iramusu)	hemidesmine
3. *Solanum virgintanum* (Katuwelbatu)	solasodine
4. *Solanum nigrum* (Kalukammeriya)	solanidine, solasodine
5. *Abraus precatorius* (Olinda)	glycyrrhizin, abrin
6. *Terminalia chebula* (Aralu)	garlic acid, phenolic substances (tannins)
7. *Vernonia cinerea* (Monarakudumbiya)	sitosterol, stigmasterol, amyrin, flavanoids
8. *Gloriosa superba* (Niyagala)	colchicine, gloriosine, lumicolchicine
9. *Azadirachta indica* (Kohomba)	azadirone, nimbidin, diterpenes, sterols, flavanoids
10. *Centella asiatica* (Gotukola)	asiaticosides
11. *Datura metel* (Attana)	atropine, hyoscine, hyocyamine, scopolamine
12. *Withania somnifera* (Amukkara)	withanine, somniferine, nicotine
13. *Trachyspermum roxburghianum* (Asamodagam)	thymol
14. *Kaemferia galanga* (Hinguru piyali)	cinnamic acid, borneol, camphene, cineol, conmarines
15. *Zingiber officinale* (Inguru)	zingiberine, camphene, phillandrene "ginger oleoresin"
16. *Coscinum fenestratum* (Banwelgeta)	berberine
17. *Rauvolfia serpentina* (Ekaweriya)	ajmalicine, thebaine, yohimbine, serpentine reserpine....
18. *Catheranthus roseus* (Minimal)	vindoline, catheranthine vincaleueoblastine, vincristine yohimbine ajmalicine...
19. *Coleus amboinicus* (Kapparawalliya)	carvacrol
20. *Sida rhombifolia* (Kotikan bevila) *Sida cordifolia* (Wel bevila)	ephidrine

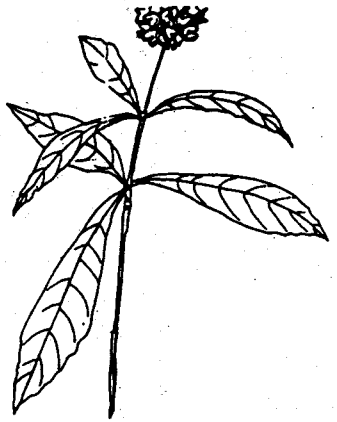
Unlike in the allopathic system of medicine, in Ayurveda it is not possible to say which single chemical compound or compounds are responsible for the therapeutic effects of a particular treatment. The part of the plant used in the preparation, the method of preparation the manner in which the drug is administered - all these play a role in achieving the desired effect from the treatment. Infact, Ayurveda is described as a way of life. The scientific approach to Ayurveda therefore has to be confined to the correct identification of plant material, standardization of the drug and standardization and quality control of the final product.

Among the medicinal plants of Sri Lanka are endangered species threatened with extinction, due to the unlimited exploitation of these by foreign nationals. Many a villager would oblige them by going into the jungles and collecting the plants - just for a few dollars. It is important for the youth of our country to realize the vast potential of our natural resources, to safe guard our heritage and improve the quality of life. Preserving and protecting our flora is one step towards achieving this goal.

Among the medicinal plants of Sri Lanka are endangered species threatened with extinction, due to the unlimited exploitation of these by foreign nationals.



Kaempferia galanga



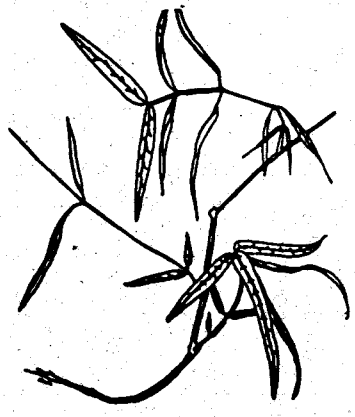
Rauvolfia serpentina (L)



Solanum nigrum L.



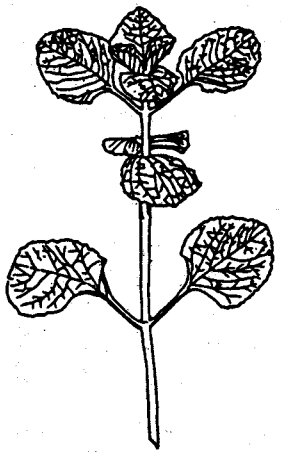
Datura metel L.



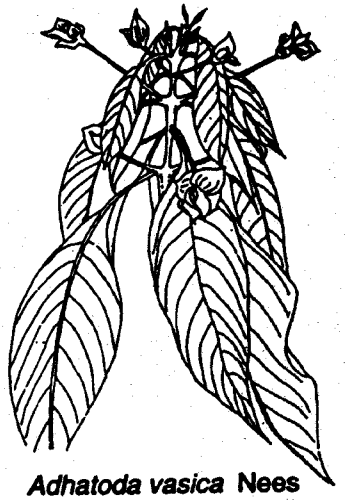
Hemidesmus indicus L.



Solanum virginiianum L.



Coleus amboinicus



Adhatoda vasica Nees

Some Medicinal Plants of Sri Lanka

THE BIOAVAILABILITY OF TRACE ELEMENTS IN FOODS OF SRI LANKA

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Trace elements such as iron, copper and zinc are micro nutrients which play an important role in the oxidative pathways involved in energy metabolism. Deficiency of these elements in humans could drastically reduce the physiological, immunological and reproductive performance. There is some information available on trace elements of local foods. But these refer to the content and not to their bioavailability. It has been reported that the organic compound like phytate, tannin and elements like calcium could interfere with absorption of these elements and reduce their bioavailability. As such, there is a need for research to study the bioavailability and total content of these elements in local food articles and interfering substances such as phytate, tannin and calcium.

Therefore, we have initiated a research project at the Division of Oral Biochemistry, Department of Biochemistry, University of Peradeniya to investigate the local foods for their bioavailability of trace elements. The determination of the bioavailability of trace elements of local foods could provide the nutritional informations necessary to overcome trace mineral deficiencies in Sri Lankan population.

To study the bioavailability of trace elements, we have used a novel method and it tries to replace the conventional animal model experiments, which are laborious, time consuming and expensive.

The method involved for the bioavailability is an *in vitro* two stage enzymatic digestion which occurs in the same order as in the events occurring in the stomach and duodenum. The food material was first subjected to digestion with pepsin at pH 2.0 and then by pancreatin at pH 7.5 A segment of dialysis tubing which is compatible with intestinal mucosa was used and the digested material was allowed to diffuse into dialysis tube. The trace element contents of dialysate were measured using atomic absorption spectrometry.

The total trace element contents were estimated by wet digestion using conc. HNO_3, perchloric and conc. H_2SO_4 acid followed by atomic absorption spectrometry. The phytate and tannin contents were estimated by preparing the coloured complexes of those followed by colorimetry. The concentrations of these substances were calculated in mg/100 g of edible portion of foods and ± SEM was calculated.

In this project we have investigated 30 food articles including cereals and pulses; rice *[Oryza sativa]* (samba, parboiled, raw- white and raw-brown), horse gram *[Cicer arietinum]* and soya bean *[Glycine max]* and vegetables; brinjal *[Solanum melongena]*, okara *[Hibiscus esculentus]*, beet *[Beta vulgaris]*, carrot *[Daucus carota]*, agathi *[Sesbania grandiflora]*, amaranthus *[Amaranthus gengeticus]*, beet leaves *[Beta vulgaris]*, black nightshade *[Solanum nigrum]*, brussels sprouts

[Brassica oleracea], cabbage *[Brassica oleracea]*, cabbage *[Brassica gemmifera]* (two species), drumstick leaves *[Moringa olerfera]*, gotukola *[Centella asicatica]* (big var.), kankun [Ipomea aquatica], leeks [Allium ambelloparasum], manioc leaves *[Manihot esculenta]*, mukunuwenna *[Alternanthera sessilis]*, onion leaves *[Allium cepa]*, passion fruit *[Passiflora edulis]*, plantain flower *[Musa sapientum]*, sarana *[Trianthema deceandra]*, spinach *[Basella alba]* (bush and creeper), valkohila *[Syngonium podothyllum]* and yellow pumpkin *[Cucurbita maxima]*.



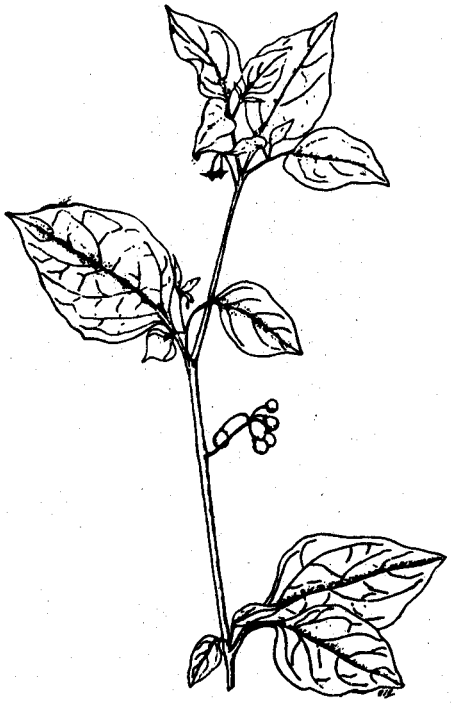
Okara *(Hibiscus esculentus)*

Of the food articles analyzed beet leaves (43.14 ± 2.76), onion leaves (39.53 ± 5.28), spinach bush (87.27 ± 0.38) and creeper (81.39 ± 1.06) and yellow pumpkin leaves (78.21 ± 1.28) had high content of iron while agathi, amaranthus, gotukola, kankun, mukunuwenna, sarana and valkohila had moderate values ranging from 20-40 mg. Other food articles had less than 20 mg.

Kankun (1.27 ± 0.06) and yellow pumpkin (1.12 ± 0.09) had high content of copper and brinjal, beet leaves, gotukola and valkohila had moderate values (0.7 - 1.0 mg) and other food articles had less than 0.7 mg of copper.

The food articles rich in zinc are amaranthus (4.36 ± 0.01), beet leaves (2.91 ± 0.18), gotukola (big var.) (3.52 ± 0.34), manioc leaves (2.93 ± 0.03), mukunuwenna (5.41 ± 0.63), spinach (bush) (2.23 ± 0.04), val-kohila (2.67 ± 0.02) and yellow pumpkin leaves (2.14 ± 0.14) leaves. However, the bioavailability of zinc in these vegetables is less than 20% except for gotukola which had 72% bioavailability of zinc. Soya bean, okara, beet, beet leaves, agathi, cabbage, kankun, leeks, passion fruit, plantain flower and sarana had moderate values ranging from 1.0 to 2.0 mg. Others had less than 1.0 mg.

The food articles high in bioavailable zinc are agathi (49%), carrot (45%), drumstick leaves (65%), gotukola (72%) and leeks (42%), however they have moderate values of total zinc except for gotukola. The bioavailability of zinc high vegetables had low (less than 30 mg) and/or moderate (30-45 mg) phytate content, low (less than 100 mg) and/or moderate (100 - 125 mg) calcium and less (less than 200 mg) and/or moderate (200-400 mg) of tannin. The bioavailability of zinc low vegetables always had high concentrations of phytate, calcium and tannin.



Black nightshade *(Solanum nigrum)*

This project is an ongoing project and it involved estimation of bioavailability of iron, copper and zinc in 9 cereals, 8 pulses, 49 vegetables, 12 spices and condiments and 5 souring agents a total of 83 samples. This project is funded by Natural Resources, Energy & Science Authority of Sri Lanka.

CURATIVE AGENTS AND HOMOEOPATHY

Dr. D. Waidyasekera
Vice President, Sri Lanka Homeopathic Medical Association

Homeopathy was founded by Samuel Hahnemann, a German physician of great emmience, a linguist and a chemist of no mean repute, in the beginning of the 18th century.

Homoeopathy is a system of therapeutics based upon the Law of 'Similars ' as expressed by the maxim 'SIMILIA SIMILUBUS CURANTUR' - Likes cure Likes. According to Hahnemann's research findings, Hippocrates and Paracelsus were aware of this law before him. But it was Hahnemann who gave it a practical application.

The working of this law in the day to day practice in a Homoeopathic clinic takes the following procedure. When a patient attends a Homoeopathic clinic, the physician takes a detailed case taking, with special emphasis on the individuality of the patient, his constitution, his desires and aversions, to various things (Food, Heat, Cold etc.). The mental and physical symptoms are recorded.

The Physician visualises a picture of the sick individual in his mind's eye and finds a similar picture of a remedy in the materia medica to match the Disease picture of the patient. It could be a Sulpher Case, A Calcarea Carbonica case or a Pulstilla case depending on the symptom picture recorded.

The Remedy of choice is the 'Similar' remedy, which goes hand in glove with the symptom picture of the patient. It is known as the 'Similimum' in Homoeopathic terminology. It is the medicine that is Homoeopathically indicated, and if prescribed in correct potency and dosage would relieve or cure the patient. This follows the Law of 'Similias' in Homoeopathy.

Let me give a few examples to illustrate the working of the 'Law of Similars'. Medicines are used to cure only the exact conditions they can produce in the healthy. - Like Cure Likes.

Cinchona bark of which quinine is an alkaloid is one of the frontline remedies in the treatment of Intermittent fever. It was the Malaria like symptoms produced by this drug that induced Hahnemann to infer that Cinchona was able to cure malaria because it had the power to produce malaria like symptoms in the healthy.

This was the turning point in Hahnemann's carrier, and the birth of a new principle in medicine.

Hahnemann's subsequent studies in toxicology drew his attention to various cases of poisoning. The cholera like symptoms produced by camphor poisoning led him to use camphor in treating cholera. It became the most successful remedy during the cholera epidemic in Europe in 1930-31. The toxic affects of Belladonna produced the exact symptoms of scarlet fever (Scarlatina), and therefore was able to cure it.

Hahnemann's analytical powers perceived the numerous events that took place in nature's cures unfolding several natural Laws previously unknown. The Natural law of Cure (the therapeutic law of cure) was one. When tow similar diseases meet together in the living organism the stronger removes the weaker permanently. Here are some examples from nature.

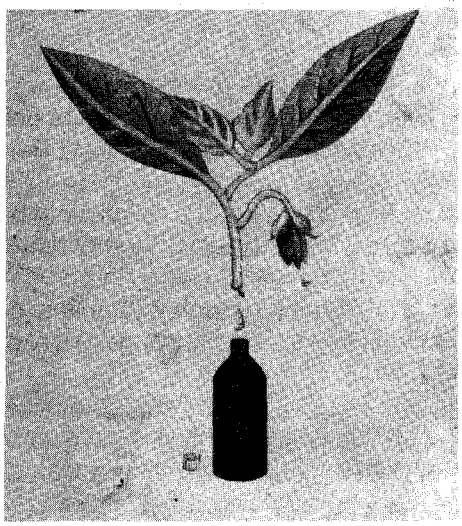
A person suffering from a swollen half paralysed arm was cured after an infection with Cowpox. This happened because Cowpox has the ability to produce a similar condition.

When a patient suffering from deafness was attacked by smallpox, his deafness was also cured with the cure of smallpox. This happened because smallpox was able to produce a similar condition. Cases of Orchitis and Ophthalmia were cured in a similar way after an attack of smallpox.

Although nature perform such cures at random, they cannot be utilized in medicine to cure the sick, due to obvious reasons. Medicines on the other hand although stronger than natural diseases are within the control of the physician, and the action of the medicine cease after a specific duration by itself.

POTENTIATION

Homoeopathic medicines are prepared by a process called Potentiation. The basic material for the medicines come from the Plant, Animal and Mineral Kingdoms.



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A special class of Medicines called *Norsodes* (prepared from diseased products); *Sarcodes* (prepared from healthy animal tissue, and secretions) and *Imponderabilia* (X'ray, magnetism, electricity) are also used.

Potentiation or Dynamization of medicines is the process by which the medicinal properties of basic substances including inert substances are liberated and raised to a dynamic level. Certain substances which are useless in their material or inert form become highly potent medicines after dynamization. For example lycopodium (club moss), which was earlier used only to roll pills, became one of the most potent medicines in the homoeopathic armamentarium.

Natrum Muriaticum (Sodium chloride or common salt) which had only the value of the pinch of salt in the house wife's kitchen shelf became one of the most effective remedies in the Homoeopathic Materia Medica.

Deadly poisons like cobra venom, viper venom, cyanides and a host of other poisonous substances find a special place in the Homoeopathic medicine chest. These highly toxic substances are transformed into non-poisonous, yet profoundly effective remedies after potentiation.

The basic drug material undergo a marked qualitative change as it goes through the process of potentiation. I would not dwell further into the intricate process of potentiation as it is not the purpose of this article. However, it would suffice to note that the drug substance undergoes a dynamic change and reaches the molecular form (Attenuation). The only electronic instrument that could measure the minute vibrations emitted by potentized medicines is the Emanometer produced by the William Boyd Scientific Trust, Glasgow.

Homoeopathic medicines are first proved on healthy human beings prior to their application on the sick. A drug proving is an experiment conducted by an eminent homoeopathy to ascertain the action on healthy human beings. The symptoms so produced by the group of persons to whom the drug has been administered are recorded, processed, and finally incorporated into the materia medica.

The salient feature of Homoeopathy is minuteness of the dose used, and its absolute lack of side-effects. Addiction to a drug never occurs due to the sub-physiological doses used.

The three cardinal principles of a Homoeopathic prescription are:

(I) The Single Remedy
(II) The Similar Remedy
(III) The Minimum Dose

A Single Remedy is given one at a time selected according to the Law of Similars (Similar Remedy). The dose used is the smallest dose possible (Minimum Dose).

Arndt's - Shultz Law states that:

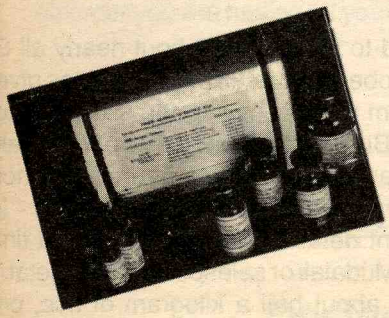
(I) Small Doses Stimulate;
(II) Moderate Doses Inhibit;
(III) Large Doses Kill.

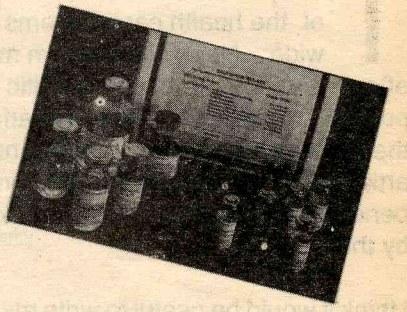
It is the (Dynamized) minute dose employed in Homoeopathy that provide the necessary stimulus to affect a cure.

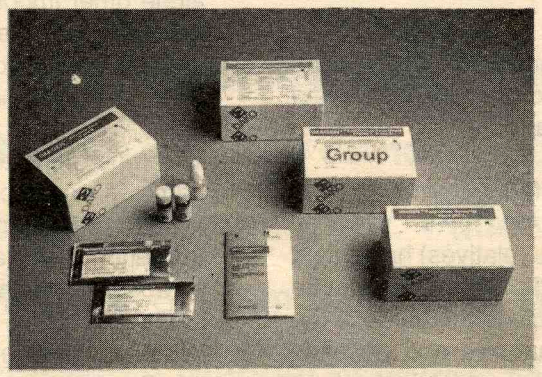
Hahnemann perceived the necessity for physicians to be guided by a definite law of prescribing. Strict adherence to the law of similars and the fundamental principles of Homoeopathy is the hallmark of the genuine Homoeopathic Practitioner.

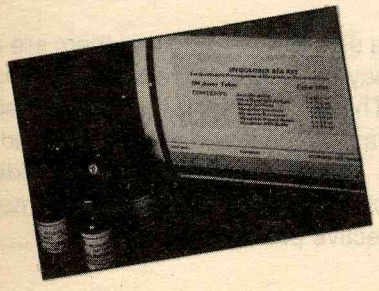
HOW TO GET THE BEST FROM WESTERN MEDICINAL DRUGS

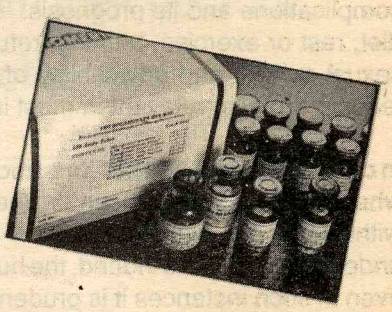
Prof. Colvin Goonaratna
Professor in physiology and Chairman
State Pharmaceuticals Corporation and
State Pharmaceuticals Manufacturing Corporation











Every patient has a right to know relevant details about the disease or disorder he or she is suffering from. These include the name of the disease or disorder, its main features and possible complications and its prognosis.

Today western medicinal drugs form an important part of the health care systems in most countries world-wide. Nearly all western medicinal drugs are highly effective, many are highly specific and some are extremely powerful. Like all useful and powerful tools, some drugs have the potential to harm if they are not properly used. In this article I will try to give you a few hints on how to get the best benefit from medicinal drugs, and how to avoid being harmed by them.

I think it would be useful to write my ideas from here on in the form of a series of questions you need to ask your doctor (and yourself) about diseases and their treatment.

1. What disease or disorder am I suffering from?

   Every patient (and often their close relatives) has a right to know relevant details about the disease or disorder he or she is suffering from. These include the name of the disease or disorder, its main features and possible complications and its prognosis. Other details such as diet, rest or exercise, bathing, return to work or school, sexual activity and advisability of pregnancy or breast feeding are also relevant in most instances.

   In cases of seriously ill persons, those with fatal illness or when the diagnosis is uncertain, the doctor may decide to withhold some information from the patient. This is understandable, and indeed, the humane thing to do. But even in such instances it is prudent to inform one or two close relatives of the patient about the illness.

2. What is the drug (or drugs) I am supposed to take?

   I have never ceased to be amazed about nearly all Sri Lankan patients will obediently take any medicines given or prescribed to them without having the slightest clue about the medicine. But the same people who would take a medicine which may determine their future life without asking the prescriber or pharmacist even its name - let alone other important details about it - will spend time talking to the Kaday Mudalali or salesperson or vegetable Ammey at the Pola about half a kilogram of rice, one metre of jacket material or a bunch of Gotukola.

   The most important thing about a drug is its generic name. A prescriber may prescribe a drug by any one of a drug's brand names, but it is his or her duty to write down the generic name also on the prescription. The patient has an absolute right to ask and to be told the generic name.

3. What are the side-effects of the drug (or drugs) I have to take?

   Most drugs have a side-effects. Most of them are minor ones, but a few may be significant, and one or two may even be serious. The good doctor is the one who tells the patient about at least the common side-effects and what to do if they occur. Those who claim that their medicines have no side-effects at all are either deluding themselves or doling out ineffective placebos.

4. What are the other things I need to know abut the drug (or drugs)?

   Other details of the drug (or drugs) prescribed for you that you must know include the dose, the number of times per day it must be taken, relationship to meals if any, duration of treatment, and its safety during pregnancy and breast feeding.

5. Are drugs safe during pregnancy and breast-feeding?

   It is safe to assume that most drugs are unsafe during pregnancy and breast feeding. Any woman of child-bearing age whose menstrual period has been delayed by even a couple of weeks, or who is breast feeding, must tell the prescriber about these two points. And it is the prescriber's duty to consider very carefully the safety of drugs prescribed for women during pregnancy or breast feeding.

6. How long should I take the medicine?

   The answer to this question depends on what illness or disorder you are having. If your trouble is a headache or a mild viral fever, aspirin or paracetamol for a day or two may be all you need in the way of medicines. If you are suffering from leprosy or tuberculosis, drug treatment has to be taken for many months. For high blood pressure and diabetes mellitus, usually drugs have to be taken for years and perhaps for a lifetime. And for cortisol or thyroid hormone deficiency, replacement with the appropriate hormone is inevitably life-long.

Conclusions

Doctors need to talk (as equals, no superiors) to patients much more than they do now, about the disorders they are suffering from and the treatment. Patients need to move away from the attitude most of them have no of silent obedience, and need to establish a friendly dialogue with their doctors as equal partners in the management of disease. Patients have an inalienable right to be informed, and doctors have a sacred duty to give information when asked. Only in this way can both doctors and patients derive the best results from western medicinal drugs.

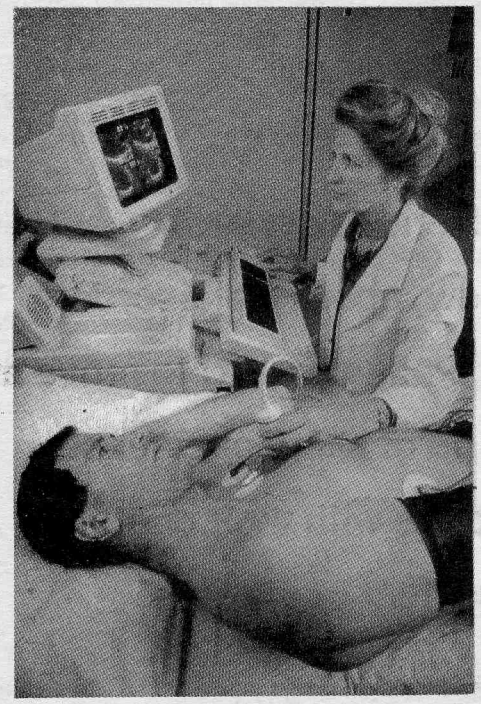
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THE DOCTOR-PATIENT-PHARMACIST INTERACTION : *CAN WE DO BETTER?*

Dr. R. L. Jayakody
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Introduction

When a patient seeks treatment from a doctor the consultation usually ends in a prescription being given to the patient. This prescription has to be given to a pharmacist to get the medicines. As you can see when the patient gets his medicines three parties get involved, *viz.*, the doctor, the patient and the pharmacist. It is important that there is proper communication amongst these parties to give maximum benefit to the patient.



When a patient consults the doctor, the doctor will be seeking information from the patient to arrive at a diagnosis. The process of diagnosis is important as the treatment which will be given to the patient will depend on the diagnosis. Each doctor has his or her own diagnostic approach to patients. Despite individual differences the diagnostic process involves taking a history, performing a physical examination and doing investigations where appropriate. Sometimes adjectives are used to emphasise the importance of each of these areas (eg. careful or detailed history, through physical examination and relevant investigations). In some conditions the diagnosis is made predominantly on the history while in others the history is not so helpful and the examination gives vital clues to the diagnosis. In yet another patient the history and examination are not helpful while the investigations (blood and urine tests and X rays etc.) decide the diagnosis. As a patient you can help the doctor (and indirectly yourself) by being prepared for some potential questions and giving accurate answers. If you are not certain about some information it is better to say that. Also the option is there for you to check some records which you may be having at home but you do not have at the time of consultation.

Giving information to the doctor

The doctor will be asking about the past and present medical history, current symptoms and their progress, your smoking and drinking habits, vaccinations, operations, illnesses that run in families etc. If you have any diagnosis cards, vaccination cards you should show them to the doctor. You could tell the doctor about contact with any patient who has similar illness etc. (infectious diseases). In a case of fever, it is extremely important to remind the doctor of any visits to malarial areas. The potential questions that could be asked from you are enormous but the important point is to be prepared. Apart from the above you should remind the doctor about certain specific items of information which could affect your life.

Some of these include:

* All other drugs you are presently taking including eye drops, skin applications, indigestion polls etc. Some of the drugs the doctor may prescribe can interact with the medicines you are already taking and affect you adversely.

* Any allergies to medicines, foods or other substances; if you have any diagnosis cards which state about allergies please show them to the doctor. This is important as some allergic reactions can lead to serious consequences, including death.

* Unless the doctor has already asked the question, you should remind about any chronic illness you are having such as diabetes, high blood pressure, asthma, rheumatic heart disease etc.



* If you are pregnant or have missed a period or plan to become pregnant or breast feeding please inform the doctor about it. This is because certain drugs should not be used during pregnancy and the doctor will avoid them if he is aware that you are pregnant. It is not uncommon to find pregnant women panicking about the drugs that had been given to them in early pregnancy, when they themselves were not sure whether they were pregnant. It is far better to avoid these circumstances by reminding the doctors.

There is responsibility on the part of the doctor to inquire about the above issues. However you should also take the initiative to remind the doctor since you could be the person that is affected. It is important that not only your regular doctor but all others who are treating you (eg. dentists, doctors in the accident department) are reminded about the issues discussed above.

Getting information from the doctor

Some doctors give a lot of information to the patients while others do not. From the patients point of view the most important method of getting information is by asking the doctor. Considering our culture some patient think that they would be offending the doctor by asking all these questions. It is far better to do the correct thing by asking the questions than to be doing the wrong thing without asking questions. The questions that can be asked from the doctor about your illness are many. In the following section some questions which you should ask about the drugs that you may be given to you are mentioned. Depending on the drug one or more of these items of information can be crucial.

If you are pregnant or have missed a period or plan to become pregnant or breast feeding please inform the doctor about it.

