Database on Antidiabetic indigenous plants of Tamil Nadhu, India

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Abstract

An Ethnobotanical and Literature survey was conducted to collect information about medicinal plants used for the treatment of diabetics and associated complications by tribals people of Tamil Nadhu. Analysis of remedies obtained from different plant parts was performed. The indigenous knowledge of plants used for the treatment of diabetics was collected through questionnaire and personal interviews. A total of 46 plants used to treat diabetes have been documented. The investigation revealed that, leaf materials (37%) followed by seeds (16%) and fruits (14%) were mostly used for the treatment of Diabetes. Anti-diabetic medicinal plants used by Tamil People have been listed along with plant parts used and its active chemical constituents.

Keywords: Diabetes, Anti-diabetic medicinal plants, Tamil Nadhu.

Introduction

Diabetes mellitus is a syndrome which affects most of the people in all countries over the world. The word diabetes was coined by the Greek physician Aeretaeus in the first century A.D. Diabetic Patients will have high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. Insulin is the principal hormone that regulates uptake of glucose from the blood into most cells. Therefore deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes mellitus.

The classical symptoms of diabetes are polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger). Currently available therapies for diabetes include insulin and various oral antidiabetic agents such as sulfonylureas, biguanides, a-glucosidase inhibitors, and glinides. Many of these oral antidiabetic agents have a number of serious adverse effects.

Plant materials which are being used as traditional medicine for the treatment of diabetes are considered one of the good sources for the development of new drug. Plant extract or different plant preparations are being prescribed by the traditional practitioners and also accepted by the users for diabetes in many countries. The tribals constitute about 7.5 percent of India's population. Traditional healers use 2500 plant species and 100 species of plants act as regular source of medicine [1]. In the developed countries, 25 per cent of the medical drugs are based on plants and their derivatives [2]. Plant-based diet diets are low in fat and high in fiber, they typically cause associated reductions in dietary energy density and energy intake, which are not fully compensated for by increased food intake [3]. A wide array of plant derived active chemical compounds has demonstrated active consistent with their possible use in the treatment of Diabetes Mellitus [4]. Some of these are alkaloids, glycosides, polysaccharides, peptidoglycans, hypoglycans, guanidine, steroids, carbohydrates, glycopeptides, terpenoids, amino acids and inorganic ions. Instead of trying to identify the active components of herbs through massive collection of plants, it is better to start investigating the efficacy of the medicinal plant based on the traditional practices by indigenous people. It is therefore, necessary to document the plants and take efficient steps to conserve them. Thus numerous medicinal and ethnobotanical uses of various plants indicate a strong association among the plant and people especially in India.

Materials and Methods

Study area

Tamil Nadu lies in the southernmost part of the Indian Peninsula. It is bound by the Eastern Ghats in the north, the Nilgiri, the Anamalai Hills, and Palakkad on the west, by the Bay of Bengal in the east, the Gulf of Mannar, the Palk Strait in the south east, and by the Indian Ocean in the south. Tamil Nadu covers an area of 130,057 square kilometres , and is the eleventh largest state in India. Tamil Nadhu lies in the Latitude and Longitude of 78° 00' E and 11° 00' N respectively. Tamil Nadu has historically been an agricultural state and is a leading producer of agricultural products in India. Common plant species in the state include: Azadirachta indica, Curcuma longa, Cajanus cajan, Eucalyptus globules, Aloe barbadensis etc.

Ethnobotanical Survey

The use of plants in treatment of Diabetes has been noted in many of the ancient Indian literature. In the last few decades the studies performed on the plants mentioned in the literature or were used traditionally for diabetes have been documented in this paper. A varying degree of anti-glycemic activity was observed in all of the plants. The ethnobotanical data were collected using questionnaire, interviews and discussions in their local dialect.

Result and Discussion

Table I, enumerates the data obtained during the investigation. A total of 46 plant species belonging to 34 families have been recorded in the present study. Plants like Aloe vera, Azadirachta indica, Momordica charantia, Gymnema sylvestre, Holostemma ada-kodien, etc were more frequently used by the people. Bitter melon has been used in various Asian and African traditional medicine systems for a long time. It was found that Momordica charantia fruit powder is helpful in treating hyper glycemic rats in diabetes mellitus type II. Charantin has been extracted from the plant, which had hypoglycaemic effect on normal and diabetic rabbits [36]. Holostemma ada-kodian, an important medicinal plant belonging to family Asclepiadaceae is used to control diabetes [37].

The usage of plant part Leaves - 19, Entire plant - 9, Seed - 8, Fruit - 7, Flower - 3, Bark - 3, Bulb - 2 are shown in Figure 1. From the data (Fig. I), it could be inferred that for more number of remedies are obtained from fresh leaf materials followed by seeds and fruits. However, plant parts like Flower, Bark and Bulb were less frequently used by the people. Data gathered during this study are in agreement with the previous reports [38, 39 and 40].

Fig I: Chart showing the analysis of remedies obtained from different plant parts.

	L (Leaves)	EP (Entire Plant)	S (Seed)	F (Fruit)	FL (Flower)	B (Bark)	BU (Bulb)
Value	19	9	8	7	3	3	2
Percentage	37%	18%	16%	14%	6%	6%	4%

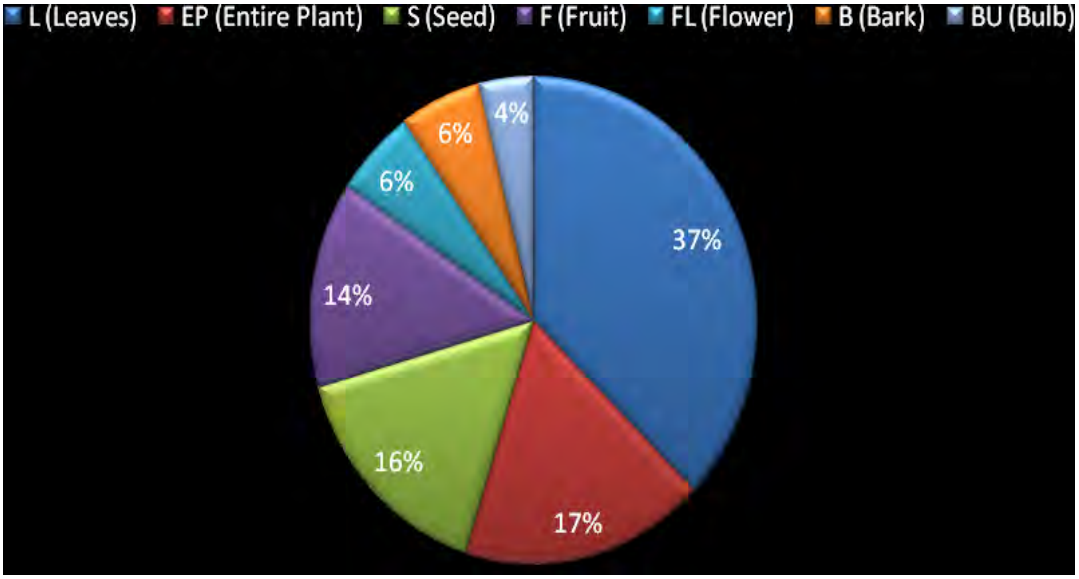

Table 1 - Analysis of remedies obtained from different plant parts for Diabetes Mellitus

L - Leaves (19), EP - Entire Plant (9), S - Seed (8), F - Fruit (7), FL - Flower (3),), B - Bark (3), BU - Bulb (2).

Botanical Name	**Common Name**	**Family**	**Parts Used**	**Active Chemical Constituent**
Acacia arabica	Indian Gum Arabic	Fabaceae	S, B	Polyphenols, tannin
Aegle marmelose	Golden apple	Rutaceae	L	Aegeline 2 [5]
Allium cepa	Onion	Alliaceae	BU	Allyl propyl disulphide, S- mehtyl cysteine sulphoxide [6]
Allium sativum	Garlick	Alliaceae	R	Diallyl disulphide oxide(allicin), ajoene [7]
Aloe barbadensis	Barbados Aloe	Asphodelaceae	L	Lophenol, 24-methyl-lophenol , 24-ethyl-lophenol, cycloartanol, and 24-methylene-cycloartanol [8]
Azadirachta indica	Neem	Meliaceae	L, S	Nimbidin [9]
Beta vulgaris	Beetroot	Chenopodiaceae	EP	Sugar beet pectin and polydextrose [10]
Biophytum. sensitivum	Sikerpud	Oxalidaceae	EP	Not known
Brassica juncea	Mustard	Brassicaceae	S, L	Isorhamnetin diglucoside [11]

Cajanus cajan	Pigeon pea	Leguminosae	S	(7R*,9aS*)-7-phenyl-octahydroquinolizin-2-one [12]
Capsicum frutescens	Chilli	Solanaceae	F	Capsaicin [13]
Cassia auriculata	Tanner's Cassia	Fabaceae	FL	Sterols, triterpenoids, flavonoids and tannins [14]
Catharanthus roseus	Red periwinkle	Apocyanaceae	EP	Vinculin Alkaloids
Cinnamomum zeylanicum	Cinnamon	Lauraceae	L, B	Cinnamaldehyde [15]
Coriandrum sativum	Coriander	Apiaceae.	L	Alanine [16]
Cuminum cyminum	Cumin seeds	Apiaceae	S	Aldehyde
Curcuma longa	Turmeric	Zingiberaceae	R	Curcuminoids [17]
Eucalyptus globules	Blue Gum	Myrtaceae	L	Calytoside
Emblica officinalis	Amla	Euphorbiaceae	F	Tannoid [18]
Ficus bengalensis	Banyan Tree	Moraceae	B	Leucopelargonidin [19]
Ficus carica	Anjir	Moraceae	F, L	Invert Sugars [20]
Glycine max	Soya beans	Fabaceae	S	3-O-methyl-D-chiro-inositol (D-pinitol) [21]
Gymnema sylvestre	Suger destroyer	Asclepiadaceae	L	Gymnemic acid and gymnema saponin [22]
Hordeum vulgare	Barley	Poaceae	S	Beta-glucan [23]
Hygrophila auriculata	Talmakhana	Acanthaceae	EP	Unknown
Ibervillea sonorae	Huereque	Cucurbitaceae	R	Monoglycerides (MG) and fatty acids [24]
Jatropha curcas	Barbados nut	Euphorbiaceae	EP	Diterpenes
Mangifera indica	Mango Tree	Anacardiaceae	L	Mangiferin [25]
Mentha piperitae	Peppermint	Lamiaceae	L	Essential oils, terpens, flavonoids and certain inorganic trace elements such as vanadium, zinc, chromium, copper, iron, potassium, sodium, and nickel
Momordica charantia	Bitter melon	Cucurbitaceae	EP	Charantin [26]

Moringa oleifera	Moringa	Moringaceae	EP	Not known.
Murraya koenigii	Curry leaves	Rutaceae	L	Carbazole alkaloids [27]
Musa sapientum	Sweet banana	Musaceae	FL	Flavonoids, steroid and glycoside [28]
Nelumbo nucifera	Sacred lotus	Nymphaeaceae	FL	Tolbutamide [29]
Nigella sativa	Roman coriander	Ranunculaceae	EP	Thymoquinone [30]
Oceimum sanctum	Holy Basil	Lamiaceae	L	Eugenol (1-hydroxy-2-methoxy-4-allylbenzene) [31]
Psidium guajava	Guava	Myrtaceae	L, F	Terpens and flavonoids
Tamarindus indica	Tamarind tree	Fabaceae	S, F	Flavonoids
Taraxacum officinale	Dandelion	Asteraceae	F	Terpens
Triticum vulgare	Wheat	Poaceae	EP	Albumin protein [32]
Turnera diffusa	Damiana	Turneraceae	L	Flavonoids, terpens
Urtica dioica	Nettles	Utricaceae	L	Flavonoids, coumarins, lectin
Vaccinium myrtillus	Bilberry	Ericaceae	F, L	Antocyanosids [33]
Withania somnifera	Winter cherry	solanaceae	L, F	Withanolide alkaloid
Xanthocercis zambesiaca	Nayala tree	Fabaceae	L	Fagomine, 4-O-beta-D-glucopyranosylfagomine and castanospermine [34]
Zingiber officinale	Ginger	Zingiberaceae	BU	Gingerols, ethanol, ethanoic acid [35]

Conclusion

Diabetes mellitus is a chronic disease that requires long-term medical attention. Since ancient times, plants have been an exemplary source of medicine for Diabetes. Phytomedicine, in addition to their traditional values, also act as novel lead compounds for drug development. Hence the world is now moving towards the herbal medicine or phytomedicines that tend to cure diseases without any toxic side effects.

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