



TRADITIONAL USE OF MEDICINAL PLANTS FOR THE MANAGEMENT OF DIABETES, HYPERTENSION AND CARDIOVASCULAR DISORDERS

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ABSTRACT Documenting the indigenous knowledge through ethnobotanical studies is important for the conservation of biological resources as well as their sustainable utilization and it is also very important to transfer the knowledge to the present generation for further studies. The present study specifically aims to document the indigenous/traditional knowledge of traditional healers of the Alappuzha district of Kerala state, India, with special reference to medicinal plants for selected lifestyle diseases. An ethnobotanical survey was conducted among the traditional practitioners of Alappuzha district to document the traditional botanical knowledge about medicinal plants for three lifestyle diseases viz. Type 2 Diabetes, Hypertension, and cardiovascular diseases. The plant specimens were collected and identified using relevant taxonomic literature. The ethnobotanical investigations have brought to light the potential application of 11 species of ethnomedicinal plants belonging to 10 families for the treatment of selected lifestyle diseases.

KEYWORDS : Lifestyle diseases, ethnobotany, medicinal plants, Type 2 Diabetes, Hypertension, cardiovascular diseases

INTRODUCTION

The history of diseases and medicine dates back perhaps to the origin of the human race. Lifestyle diseases are most common in developed and developing countries where people are inclined towards sedentary lifestyles. The Cultural Revolution and luxurious lifestyles have made a remarkable shift in the food habits of people all over the world with increased reliance on junk foods and soft drinks. This situation has brought about an alarming situation with a sporadic increase in the incidences of lifestyle diseases such as diabetes mellitus, cardiovascular diseases, cancer, blood pressure, and osteoporosis all over the world. Besides, Cardiovascular diseases account for most deaths ie.17.9 million people annually (<https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>). There are a lot of medicines and treatments in allopathy for lifestyle diseases. However, the use of these allopathic medicines causes a lot of side effects. On the other hand, the traditional knowledge represents selective uses of different plants or their parts or products without any side effects for various diseases. This knowledge is passed from generation to generation orally. However, in the last two centuries, this important knowledge stands in danger of being lost because of a lack of interest among younger generations. This situation calls for more ethnobotanical studies and documentation of this precious knowledge. Documenting the indigenous knowledge through ethnobotanical studies is important for the conservation of biological resources as well as their sustainable utilization and it is also very important to transfer the knowledge to the present generation for further studies.

MATERIALS AND METHODS

The present study aims to document the traditional botanical knowledge of medicinal plants for lifestyle diseases with special reference to the Alappuzha district, Kerala, India. The methodologies adopted to achieve the above objectives are presented below under appropriate headings.

Study Site, Population, and Ecology

The ethnobotanical survey was conducted among traditional healers of the Alappuzha district, Kerala, India. Alappuzha is located at 9.54°N 76.40°E with an area of 1414 sq. Km. Alappuzha is a sandy strip of land intercepted by lagoons, rivers, and canals. There are no mountains or hills in the district except some scattered hillocks lying between Bharanikkavu and Chengannur blocks in the eastern portion of the district. Owing to its proximity to the sea, the climate of Alappuzha is humid and hot during the summer, although it remains fairly cool and pleasant during October and November. The average monthly temperature is 27°C. The average rainfall received by the region is 2763 mm (<https://www.worldweatheronline.com/alappuzha-weather-averages/kerala/in.aspx>). This is a highly populated area with 2,127,789 people as per the 2011 Census (<https://alappuzha.nic.in/demography/>).

Ethnobotanical Survey and Specimen Collection

Ethnobotanical information was gathered from 5 traditional healers

from the study area randomly. The informants were selected based on their knowledge of medicinal plants for treating others. The ethnobotanical data (local name, mode of preparation, medicinal uses) were collected according to the methodology suggested by Cotton (1996) and Jain (1963), through interviews and discussions among the traditional healers and herbal collectors in their local language. Samples of all the medicinal plants cited by the herbal collectors were collected with their assistance. These plants were identified using taxonomic literature (Gamble, 1935; Sasidharan, 2004) and authenticated. The details collected from the informants by semi-structured interview schedule were analyzed and the details of the analysis are given below.



Figure 1: Study area

RESULT AND DISCUSSION

An ethnobotanical survey was conducted among the traditional practitioners of Alappuzha district to document the traditional botanical knowledge about medicinal plants for six lifestyle diseases viz. Type 2 Diabetes, Hypertension, and cardiovascular diseases. The plant specimens were collected and identified using relevant taxonomic literature. The ethnobotanical investigations have brought to light the potential application of 11 species of ethnomedicinal plants belonging to 10 families for the treatment of 3 different lifestyle

diseases. The detailed results of the present investigation are summarized below under appropriate heads.

1. Type 2 Diabetes

For the treatment of Type 2 Diabetes, we have identified 7 medicinal plants and their details are presented below (table:1).

Table – 1 Details Of Plants Identified For The Treatment Of Type 2 Diabetes

Sl. No.	NAME OF THE PLANT	FAMILY	PART USED	COMBINATION (Single/Combination)
1	Murraya koenigii	Rutaceae	Leaf	Combination
2	Boerhaavia diffusa	Nyctaginaceae	Root	Single
3	Phyllanthus emblica	Euphorbiaceae	Fruit	Single
4	Curcuma longa	Zingiberaceae	Rhizome	Combination
5	Gymnema sylvestrae	Asclepiadaceae	Leaves	Combination
6	Mimosa pudica	Fabaceae	Leaf	Combination
7	Tinospora cordifolia	Meni-spermaceae	Stem	Single

Murraya koenigii: Small tree with aromatic pinnately compound leaves coming under the family Rutaceae is used as 'curry leaves' in Kerala (Fig. 1.1). Most traditional healers suggested that Murraya koenigii can reduce diabetes. The best method of usage is to add its leaves to food. The antidiabetic property of Murraya koenigii was reported by several researchers (Sarika et al., 2006). In Ayurvedic medicine, curry leaves are believed to have several medicinal properties such as anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, anti-carcinogenic, and hepato-protective (capability to protect the liver from damage) properties. The roots are used for treating body aches and the bark is used for snake bite relief.

Boerhaavia diffusa: Herb with long trailing branches; reddish stem and tomentose simple leaves (Fig. 1.2). According to the traditional healers, the decoction of Boerhaavia diffusa root is a good remedy for diabetes. It is also mentioned in traditional text. Besides, it is used as diuretics, anti venomous, etc. The powdered root alone or combined with oxide of iron was given in Bright's diseases or anemia (Indian medicinal plant). Moreover, earlier researchers had reported the efficacy of the Boerhaavia diffusa in reducing diabetes (Mahesh, 2012).

Phyllanthus emblica is Deciduous trees reaching up to 15 m high with grey-brown, rough bark, and alternate, biparous Leaves on short deciduous branchlets (Fig. 1.3). The fruit of Phyllanthus emblica is a good remedy for diabetes. The patients can directly eat the fruit. Also, the knowledge from the traditional text supports its use in vitiated conditions of tri dosha, diabetes, cough, and asthma. Its root bark is useful in ulcer and gastrohelcolicosis. The bark is useful in gonorrhoea, jaundice, and diarrhea (Pranati and Thirunavoukkarasu, 2016).

Curcuma longa L.: Stemless herbs often with accessory stipitate tubers, leaves usually oblong or broadly, lanceolate, rarely narrow, often with very large flowers in a dense, bracteate, strobiliform spike. The present study brings about the crucial fact that the Curcuma longa (Fig.1.4) is very effective for diabetes. The traditional healers suggest Curcuma longa for diabetes and also for the purification of the blood. According to them, intake of rhizomes of Curcuma longa along with the root of Boerhaavia diffusa can reduce diabetes. The rhizomes are bitter, acrid, thermogenic, emollient, anodyne, anti-inflammatory, antiseptic, antistomachic, antihelminthic, laxative, and diuretic. The other therapeutic properties mentioned in the traditional text are for inflammations, ulcers, wounds, leprosy, skin diseases, allergic conditions as well as discoloration of the skin, anorexia, dyspepsia, asthma, anemia, bronchitis, fever, jaundice, conjunctivitis, and diabetes (Ekta et al., 2011).

Gymnema sylvestre: Twining shrubs or under shrubs with simple opposite leaves and small flowers in crowded axillary or lateral umbellate cymes (Fig. 1.5). The traditional healers suggest Gymnema as an effective drug for diabetes. The leaves of this plant cause hypoglycemia soon after the administrations of the drugs whether by

mouth or by injection. In traditional texts also this plant is described as hypoglycemic, bitter, acrid, cooling, and antihelminthic. The drug has no direct action on carbohydrate metabolism and acts indirectly through stimulating the insulin secretion of the pancreas. In another traditional text, this plant is treated for the remarkable property of paralyzing the sense of taste (Leha and Paul, 2019).

Mimosa pudica L. is a Straggling herb with prickles. Leaves alternate to 12 cm long, pinnae 5-10 pairs and show Scismonastic response, and hence the plant is commonly called 'touch me not plant'. Pink Flowers are formed in globose heads, fruit is a Lomentum (Fig.1.6). According to the traditional healers, the use of Mimosa pudica leaves along with Phyllanthus emblica, Centella asiatica, Oxalis corniculata, and Moringa oleifera is very effective for diabetes, cholesterol, and blood pressure. This finding is in agreement with traditional knowledge given in the ayurvedic text, where this plant is described as an alternative use in disease arising from corrupted blood and bile, bilious, fevers, piles, jaundice, leprosy, ulcer, and Smallpox. A decoction of the root of this plant is considered to be useful in urinary complaints. A piece of cotton dipped in leaf extract of Mimosa pudica if used for dressing around the forehead can reduce any form of the sinus. The leaf and stem in combination with other drugs are recommended for the treatment of snakebite, Kapha, leprosy, asthma, vaginal & uterine complaints, inflammation, burning sensation, fatigue, leucoderma, and diseases of the blood (Joseph et al., 2013).

Tinospora cordifolia: A climbing shrub with succulent stem, the bark papery at first then corky and with yellow flowers (Fig.1.7). Traditional healers believe that decoction of the stem of Tinospora cordifolia is effective against diabetes. The traditional healers also suggest its use along with Solanum nigrum stem juice for reducing diabetes. Other therapeutic properties mentioned are antipyretic, expectorant, cough, jaundices, giddiness, vomiting, piles, anemia, and chronic fever (Babu and Madhavi, 2006).

Hypertension (BP)

For the treatment of Hypertension, we have identified 2 medicinal plants and their details are presented below (Table: 2).

Table 2: Details of plants identified for the treatment of hypertension

Sl. No	NAME OF THE PLANT	FAMILY	PART USED	COMBINATION (Single/Combination)
1	Moringa oleifera	Moringaceae	Leaf	Single
2	Centella asiatica	Apiaceae	Whole plant	Combination

Moringa oleifera: Small trees; branchlets lenticellate. Leaves tripinnate; white flowers in axillary panicles (Fig.2.1). As reported by Traditional Vaidyans, root bark juice (10-20 ml) of Moringa (Moringa oleifera) is very effective for the treatment of hypertension, Cholesterol, and urolithiasis. This finding conforms with the information provided in classic ayurvedic text (Warrier et al. 1996). This plant is also used as an antihistaminic, anthelmintic, antiseptic, aphrodisiac, cardiotoxic, and carminative, and tonic drug. It is believed to be good for cancerous growth, glandular diseases, paralysis of different organs, rheumatism, splenic diseases, and obesity (Pandey, 2001: Vol. III p.452).

Centella asiatica: Herbs, rooting at nodes. Leaves orbicular-reniform, 3-5 cm across, crenate or sub-entire, glabrous, nerves radiating; petiole to 12 cm long, sheathing at base. Flowers sessile, pink, in 2-5 flowered umbels (Fig.2.2). A few respondents suggested that 'Kudagan' (Centella asiatica) is an effective drug for the treatment of hypertension. A whole-plant decoction was recommended for the treatment of the same. However, they insisted to use only 5-6 plants (maximum 10gm)/ day, since the drug in higher doses is narcotic and induces coma in certain cases. This finding agrees with earlier reports (Mohd and Kumar, 2011). The drug Centella asiatica is reported to have diuretic, intellect promoting, cardiotoxic, stomachic, and anti-leprotic properties (Kritikar and Basu, 1918).

Cardiovascular diseases

For the treatment of cardiovascular diseases we have identified 2 medicinal plants and their details are presented below (Table: 3).

Table 3: Details of plants identified for the treatment of

cardiovascular diseases

Sl. No.	NAME OF THE PLANT	FAMILY	PART USED	COMBINATION (Single/Combination)
1	Datura stramonium	Solanaceae	seed	Combination
2	Desmodium gangeticum	Fababceae	Root	Single

Datura stramonium: is an annual branched herbaceous plant with big, hairy, simple leaves and dentate funnel shaped, white- or purple-coloured flowers (Fig.3.1). As per the present study, this plant is used to relieve distress, palpitation, aortic ailment, and cardiac pains. All parts of the plant are toxic, but the amount of alkaloids is maximum in the ripe seeds, therefore this plant should be used under the strict guidance of a traditional/medicinal practitioner only. Besides, a paste of fruit of Datura stramonium (Ummam) along with Tinospora cordifolia, Cynodon dactylon, and Sesame seed when applied externally will reduce Osteoporosis. As per the traditional knowledge given in the ayurvedic texts the roots are used to treat bites from rabid dogs and also used to cure insanity. A poultice made out of the leaves is used for ophthalmodynia, sciatica, neuralgia, mumps, and painful swellings (Kritiker and Basu, 1999). Earlier researchers reported that Datura has been used for curing various human ailments including ulcers, wounds, osteoporosis, inflammations, swelling as well as bronchitis. It was also reported to have an anti-cancer effect against human epidermal carcinoma of the nasopharynx at a therapeutic dose of 0.05 to 0.1g (Priyanka et al. 2012; Bhakta et al., 2013).

Desmodium gangeticum: is a perennial erect or ascending shrub with small ovate-oblong leaves and small purple or white flowers (Fig. 3.2). According to the traditional healers the decoction of the root of the Desmodium gangeticum is effective against heart diseases. These findings are in agreement with traditional knowledge given in ayurvedic texts. The other therapeutic properties are, the root is astringent in diarrhea, nausea, fever, asthma, tridosa, inflammation, vitiated conditions of vatha, and bronchitis (Kritiker and Bhasu, 1935).

CONCLUSION

Due to Cultural Revolution, there is a sporadic increase in the incidences of lifestyle diseases such as diabetes mellitus, urolithiasis, cardiovascular diseases, cancer, blood pressure, and osteoporosis all over the world. The present study specifically aims to document the indigenous/traditional knowledge of traditional healers of Alappuzha district of Kerala state with special reference to medicinal plants for treating Type 2 Diabetes, Hypertension, and cardiovascular diseases. A survey was conducted among the selected traditional practitioners of the Alappuzha district. This ethnobotanical investigation has brought to light the potential application of 11 species of ethnomedicinal plants belonging to 10 families for the treatment of selected lifestyle diseases. For the treatment of hypertension, and cardiovascular diseases we have identified 2 medicinal plants each, and for Type 2 Diabetes we have identified 7 medicinal plants. Hope this documentation will act as a database for further multidisciplinary researches.

Plants Identified for the Treatment of HypertensionFig. 2.1 *Moringa oleifera*Fig. 2.2 *Centella asiatica* (L.)**Plants Identified for the Treatment of Cardiovascular Diseases**Fig. 3.1 *Datura stramonium*Fig. 3.2 *Desmodium gangeticum***Plants Identified for the Treatment of Type 2 Diabetes**Fig. 1.1 *Marryna koozeigi*Fig. 1.2 *Boerhaavia diffusa*Fig. 1.3 *Phyllanthus emblica* L.Fig. 1.4 *Carcama longa*Fig. 1.5 *Gymnema sylvestri*Fig. 1.6 *Mimosa pudica*Fig. 1.7 *Tinospora cordifolia***REFERENCES**

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