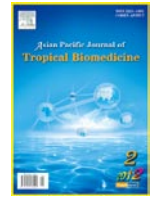




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Ethnobotanical Study of Anti-diabetic medicinal plants used by the local people in Javadhu hills Tamilnadu, India

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ABSTRACT

Objective: To conduct an ethnobotanical survey and to collect information from local people of Javadhu hills about the use of traditional medicinal plants diabetes treatment. **Methods:** Javadhu hills were surveyed through interviewing randomly selected 312 local participants using semi-structured questionnaire and regular field visits. **Results:** The investigations revealed that about 40 traditional plant species and their local names with parts used for the treatment were recorded by the local people of Javadhu hills. **Conclusions:** The study led to the abundant knowledge of wealth of traditional medicinal plants that are being used for the diabetes treatment by the local people of Javadhu hills.

1. Introduction

According to the World Health Organization (WHO) about 65–80% of the world's population in developing countries depends essentially on plants for their primary healthcare due to poverty and lack of access to modern medicine [1]. The traditional systems of the medicine like Chinese, Ayurvedic, Unani and Sidha are very effective particularly in rural areas for the treatment of various ailments. In spite of the advent of the modern medicines, tribal populations are still practicing the art of herbal medicine. The knowledge of the use of medicinal plants and their properties was transmitted from generation to generation [2]. But this knowledge transmission is in danger because of older and younger generation is not always assured [3]. In Indian medicine systems, Ayurveda, Sidha and Unani entirely and Homeopathy partially depend either on plant materials or their derivatives for treating human ailments [4]. Nearly 1,100 species were recognized as source of raw materials for Ayurvedic and Unani formulations [5]. Right from its

beginning, the documentation of traditional knowledge especially on use of medicinal plants has provided important information for modern drugs [6] and even today this area holds much more hidden thesaurus. About 25% of drugs in modern pharmacopoeia were derived from plants (phytomedicines) and many others were synthetic analogues built on prototype compounds isolated from plants [7]. Apart from ethnobotanical property and primary health care system, medicinal plants were also the alternate source of income for the underprivileged communities [8], hence critical understanding and rebuilding of such communities has become imperative to strengthen their livelihood.

Diabetes mellitus is a metabolic disease characterized by high blood glucose level resulting from defects in insulin secretion, insulin action or both [9]. It is a chronic disorder that affects the metabolism of carbohydrates, fats, proteins and electrolytes in the body, leading to severe complications which are classified into acute, sub-acute and chronic [10]. Increase in the incidence of diabetes has become a very common problem in our society. It is a challenge to developing countries like India to successfully combat this disorder. Diabetes is a very serious disease, if left unchecked. It can bring serious consequences including

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death. Fortunately, it is a disease that can be managed. The present study is focused to know the traditional medicinal plants wealth that is being used by the local people of Javadhu hills for the treatment of diabetes.

2. Materials and methods

Javadhu hill range, formerly situated in North–Arcot district is now included in the North–Arcot Ambedkar and in Tiruvannamalai–Sambuvarayar districts in the recent bifurcation. The North–Arcot Ambedkar district lies amidst

Table 1

Medicinal plants used for the treatment of Anti–diabetic by local people.

Scientific name	Family	Local name	Parts used	Mode of action
<i>Andrographis paniculata</i>	Acanthaceae	Nilavembu	Leaves	The juice of the leaves used for diabetes.
<i>Azadirachta indica</i>	Meliaceae	Veempu	Leaves	Powdered leaves are used for diabetes.
<i>Aegle marmelos</i>	Rutaceae	Vilvam	Leaves	The dried and powdered leaves are used for diabetes.
<i>Aristolochia bracteolata</i>	Aristolochiaceae	Aaduthinnappalai	Leaves	Leaf juice is taken orally to treatment of diabetes.
<i>Aloe vera</i>	Liliaceae	Kattraazhai	Leaves gel	Leaf gel are taken orally to control diabetes.
<i>Allium sativum</i>	Liliceae	Vellai poondu	Leaves	Juices of the leaves is used for diabetes.
<i>Allium cepa</i>	Alliaceae	Vengkaayam	Bulb onion	Bulb of the onion is used for diabetes.
<i>Adhatoda vasica</i>	Acanthaceae	Adhatoda	Leaves	Leaf juice from this plant used for diabetes.
<i>Brassica juncea</i>	Cruciferae	Kadugu	Seed	Seed decoction is taken daily
<i>Cassia auriculata</i>	Caesalpinacea	Avaram	Flower	Daily three or four flower are taken regularly
<i>Cajanus cajan</i>	Fabaceae	Thovaray	Seed	Seeds boiled and taken along with food items
<i>Costus igneus</i>	Costaceae	Kostum	Leaves	Leaves juice is used for the treatment of diabetes
<i>Colocasia esculenta</i>	Araceae	Shaepamkizhangu	Leaves	Powdered leaves are used to treat diabetes
<i>Coccinia grandis</i>	Cucurbitaceae	Koovai	Fruit	Fruits is used for the treatment of diabetes.
<i>Curcuma longa</i>	Zingiberaceae	Kasturimanjal	Rhizome	Rhizome is used for diabetes
<i>Cuminum cyminum</i>	Apiaceae	Cheerakam	Seed	Seeds is used for diabetes.
<i>Ficus benghalensis</i>	Moraceae	Aalamaram	Bark	Bark decoction is used for diabetes
<i>Euphorbia hirta</i>	Euphorbiaceae	Amman pacharisi	Leaves	Leaf juice is take orally for treatment of diabetes
<i>Eclipta alba</i>	Asteraceae	Karsalamkanni	Leaves	Leaf is used for the treatment of Diabetes
<i>Enicostemma littorale</i>	Gentianaceae	Vellaruku	Leaves	The powered leaves are used for diabetes.
<i>Eugenia jambolana</i>	Myrtaceae	Naval	Seed	Early morning seeded powered is taken to cure diabetes.
<i>Ficus racemosa</i>	Moraceae	Atthi	Root	Root decoction is taken orally to cure diabetes.
<i>Gymnema sylvestre</i>	Apocyanaceae	Sakkaraikolli	Leaves	Leaf juice is taken daily
<i>Hibiscus rosa sinensis</i>	Malvaceae	Chemparathy	Leaves	Fresh leaf is taken regularly
<i>Murraya koenigii</i>	Rutaceae	Karuvepalai	Leaves	Leaf juice is taken to treat diabetes
<i>Momordica charantia</i>	Cucurbitaceae	Pavakai	Seed	Seed powder is mixed with water and taken orally to treat diabetes.
<i>Moringa oleifera</i>	Moringaceae	Murungai	Leaves	Early morning leaf juice is taken orally to cure diabetes
<i>Marsilea minuta</i>	Marsileaceae	Aarakkerai	Leaves	Leaf juice is used for diabetes.
<i>Mangifera indica</i>	Anacardiaceae	Mamaran	Leaves	The powered leaves are mixed with cow milk and taken orally to cure diabetes.
<i>Melia azedarach</i>	Meliaceae	Malai vembu	Seed	Seeds is used for the treatment of diabetes.
<i>Ocimum sanctum</i>	Lamiaceae	Tulsi	Leaves	Early morning a pinch of leaf is taken to treat diabetes.
<i>Punica granatum</i>	Lythraceae	Madulai	Flower	Flower is very good antidiabetic properties
<i>Phyllanthus amarus</i>	Euphorbiaceae	Kilanelli	Leaves	Leaf juice is taken orally to treat diabetes.
<i>Phyllanthus emblica</i>	Euphorbiaceae	Nellikkaai	Fruit	Fruits are very good antioxidant properties.
<i>Psidium guajava</i>	Myrtaceae	Koiyaa	Fruit	Daily one fruits is taken to cure diabetes.
<i>Spermacoce hispida</i>	Rubiaceae	Nathachuri	Leaves	The powered leaves are taken twice daily.
<i>Solanum nigrum</i>	Solanaceae	Manattakkali	Leaves	Leaf juice is taken orally.
<i>Trigonella foenum</i>	Fabaceae	Vendhyem	Seed	Seed is hypoglycemic.
<i>Vinca rosea</i>	Apocynaceae	Nittiyakalyani	Leaves	Leaf juice is taken orally to treat diabetes.
<i>Withania somnifera</i>	Solanaceae	Amukkuran	Leaves	The juice of the leaves used for diabetes.

Table 2

Plants having active antidiabetic principles [14].

Scientific name	Family	Local name	Active principle
<i>Andrographis paniculata</i>	Acanthaceae	Nilavembu	Andrographolide
<i>Azadirachta indica</i>	Meliaceae	Veempu	Beta-sitosterol
<i>Allium sativum</i>	Liliceae	Vellai poondu	Diallyl trisulfide
<i>Eugenia jambolana</i>	Myrtaceae	Naval	Anthocyanins
<i>Gymnemasylvestre</i>	Apocyanaceae	Sakkaraikolli	Gymnemic acid IV
<i>Momordica charantia</i>	Cucurbitaceae	Pavakai	Polypeptide-P
<i>Trigonella foenum-graecum</i>	Fabaceae	Vendhyem	Trigonellin

the districts of Tiruvannamalai–Sambuvarayar, Chennai, Dharmapuri of Tamilnadu and Chittoor district of Andhra Pradesh. The Javadhu hill range comprises of hills running from the North to the South attaining a maximum length of 64kms, and a width of 25kms, and spread within the taluks of Polur, Tiruppattur, Chengam, Vaniyambadi and Vellore. The Javadhu hill complex along with Pudurnadu hills spread out between 12024' and 12055' of northern latitude and 78035' of eastern longitude at the average height of 2300 feet, covering the area of 2405 sq.km. Totally 2, 26, 782.96 hectares of area is under the reserve forest in the Javadhu and Pudurnadu hill regions. The forest consists of dry mixed deciduous to thorny shrubs with occasional patches of dry evergreen growth. The maximum temperature raises to 44.40C in May and minimum lies at 11.70C in January. The average rainfall is about 886mm. Ethnobotanical data were collected according to the methodology suggested earlier [11]. The ethnobotanical data were collected using questionnaires, interviews and discussions in among local tribal people. A total of more than 312 respondents were interviewed, which included males and females that depended on plants as sources of medicines either for self- medication or for treating others. The Flora of Presidency of Madras [12] and an excursion flora of central Tamilnadu [13] were used to ascertain the nomenclature of the plant species used for identification and authentication of the plants. Folklore medicinal plants data which represents their botanical names followed by their family and vernacular names.

3. Result

In this study, we focused mainly on plant species reported by the local people in and around the study area for their medicinal uses. Present data are the general results of the ethnobotanical survey conducted from January to June (2011). In the present investigation 40 medicinal plants are used for the treatment of diabetes (Table: 1). Among all the species, *Andrographis paniculata*, *Azadirachta indica*, *Moringa oleifera*, *Cassia auriculata*, *Ocimum sanctum*, *Brassica juncea*, are commonly by the local people for the treatment of diabetes. These medicinal plants were mostly useful in local people for their treatment of diabetes. The

phytochemical obtained from some of these plants, effective drugs have been formulated (Table: 2).

4. Discussion

The present study was conducted to investigate the use of traditional medicinal plants in treatment of by the people of Javadhu hills. It was observed that 40 traditional medicinal plants were used by the local people for the treatment of diabetes. The plant parts such as seed, rhizome, leaves and root were used by the local people. The plant materials prepared as decoction, infusion, aqueous extracts in milk or honey were used for the treatment of diabetes. The plants that are being used by the local people of the study area drugs have been isolated from 7 plants for the treatment of diabetes [14]. The efficacy of these ethnomedicinal plants needs to be subjected to pharmacological validation. Some antidiabetic plants may exert their action by stimulating the function or number of beta-cells and thus increasing insulin release [15–20].

The study highlighted the central role of traditional herbal medicine for the treatment of diabetes in Javadhu hills. Ethnobotanical survey is most useful for scientists, research scholars and scientific companies for further studies on isolation and identification of active compounds, that can be formulated into antidiabetic drugs. Isolated drugs can use for diabetic patients.

Conflict of interest statement

We declare that we have no conflict of interest.

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Reference

- [1] Sharma KA, Kumar R, Mishra A, Gupta R. Problems associated with clinical trials of Ayurvedic medicines. *Rev Bras Farmacogn Braz J Pharmacogn* 2010; **20**(2): 276–281.
- [2] Subodh S. Production and Productivity of Medicinal and Aromatic Plants in Mughal India: A Study of Contemporary Texts. *Asian Agri History* 2010; **15**(1): 3–12.
- [3] Anyinam C. Ecology and ethnomedicine: exploring links between current environmental crisis and indigenous medical practices. *Social Science and Medicine* 1995;**4**: 321–329.
- [4] Joseph B, Justinraj S. A comparative study on various properties of five medicinally important plants. *Int J Pharm* 2011; **7**(2): 206–211.
- [5] Medicinal Crops Available online [http://medicinalplantsinfo.blogspot.com/] 2011.
- [6] Yirga G. Ethnobotanical Study of Medicinal Plants in and Around Alamata, Southern Tigray, Northern Ethiopia. *Current Res J Bio Sci* 2010; **2** (5) : 338–344.
- [7] Arunachalam G, Karunanithi M, Subramanian N, Ravichandra V, Selvamuthukumar S. Ethno Medicines of Kolli Hills at Namakkal District in Tamilnadu and its significance in Indian Systems of Medicine. *J Phar Sci Res* 2009; **1**(1): 1–15.
- [8] Bussmann RW, Sharon D, Vandebroek I, Jones A, Revene Z. Health for sale: the medicinal plant markets in Trujillo and Chiclayo, Northern Peru. *J Ethnobi Ethnomedi* 2007; **3**: 37.
- [9] Khan A, Zaman G, Anderson RA. Bay leaves improve glucose and lipid profile of people with Type 2 diabetes. *J Clin Biochem Nutr* 2009; **44**:52–56
- [10] Ayoola OO. Recent advances in childhood diabetes mellitus. *Annal Iba Postgrad Medi* 2008; **6**(2) :9–20.
- [11] Jain SK. Ethnobotany in Modern India. Phytomorphology Golden Jubilee Issue: *Trends in Plant Sciences*. 2001; 39–54.
- [12] Gamble JS. The Flora of the Presidency of Madras. Adlard and Son's Ltd, London.1935.
- [13] Matthew KM. An Excursion Flora of Central Tamilnadu. Oxford and IBH Publishing Co., New Delhi. 1991.
- [14] Gupta R, Bajpai KG, Johri S, Saxena AM. An overview of Indian novel traditional medicinal plants with antidiabetic potentials. *Afr J Trad CAM* 2008; **5** (1): 1 – 17.
- [15] Sivaraj A, Devi K, Palani S, Vinoth kumar P, Senthil kumar B, David E. Anti-hyperglycemic and Anti-hyperlipidemic effect of combined plant extract of Cassia auriculata and Aegle marmelos in streptozotocin (STZ) induced diabetic albino rats. *Int J Pharm Tech Res* 2009; **1**(4): 1010–1016.
- [16] Sefi M, Fetoui H, Lachkar N, Tahraoui A, Lyoussi B, Boudawara T, Zeghal N. Centaurium erythraea (Gentianaceae) leaf extract alleviates streptozotocin-induced oxidative stress and β -cell damage in rat pancreas. *Journal of Ethnopharmacology* 2011 **135**(2):243–250.
- [17] Bamosa AO, Kaatabi H, Lebda FM, Al Elq AM, Sultan AA. Effect of Nigella sativa seeds on the glycemic control of patients with type 2 diabetes mellitus. *Indian J physiol pharm* 2010; **54** (4): 344–354.
- [18] Adewole SO, Caxton-Martins EA. Morphological Changes and Hypoglycemic Effects of Annona Muricata Linn. (Annonaceae) Leaf Aqueous Extract on Pancreatic β -Cells of Streptozotocin-Treated Diabetic Rats. *African Jour Biomedical Research* 2006; **9**:173 – 187.
- [19] Abdollahi M, Zuki ABZ, Goh YM, Rezaeizadeh A, Noordin MM. The effects of Momordica charantia on the liver in streptozotocin-induced diabetes in neonatal rats. *Afr. J. Biotechnol* 2010; **9**(31): 5004–5012.
- [20] Rezaeizadeh A, Zakaria ZAB, Abdollahi M, Meng GY, Mustapha NM, Hamid MB, Tengku Ibrahim TAZ. Antioxidant and antihyperglycaemic effects of an aqueous extract from Momordica charantia fruit in a type II diabetic rat model. *Journal of Medicinal Plants Research* 2011; **5**(14):2990–3001.