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**ETHNOBOTANICAL EXPLORATIONS ON ANTI-DIABETIC PLANTS
USED BY TRIBAL INHABITANTS OF SESHACHALAM FOREST OF
ANDHRA PRADESH, INDIA**

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ABSTRACT

An ethnobotanical exploration was conducted to collect information about medicinal plants used for the treatment of diabetics and associated complications by tribals in Seshachalam forest, Chittoor District, Andhra Pradesh, India. The indigenous knowledge of local traditional healers and tribal doctors of Irula, Yanadi, Sugali, Nakkal for native plants used for the treatment of diabetics related health disorders were collected through questionnaire and personal interviews. The present study describes the identification of plants and documentation of plants well known for medicinal value by the virtue of tribal traditional practices. A total of twelve informants within the age group of 45 to 65 were interviewed, among them two were herbal practitioners. Our investigation revealed that, the local medico-botanical knowledge remains pretty specific to each single area and the traditional healers, tribal inhabitants use 46 species of plants belonging to 40 families to treat diabetics and related complications. Anti-diabetic medicinal plants used by different tribes have been listed along with preparation of their medicine. This paper showed many medicinal plants from different families of which are purely anti-diabetic potential.

Key Words: Anti-diabetic Plants, Seshachalam, Ethnobotanicals

INTRODUCTION

Traditional plant therapies and attention to dietary measures increasing in recent decades has ignited a new wave of research interest in plant kingdom. India holds a credibility of diverse social, cultural and medical heritage with an unbroken tradition coming down across millennia. Though, medical heritage is centuries old, millions people in rural area still depend on traditional medicine to congregate their healthcare needs (Ved and Goraya, 2008). A mounting body of research is hoisting the credibility of traditional knowledge in meeting the challenges of primary healthcare and management of natural resource globally (Ragupathy and Newmaster 2008).

Diabetes mellitus (DM) is a metabolic disorder caused by insufficient or inefficient insulin secretory response and it is characterized by increased blood glucose levels (hyperglycemia) (Pranav and Mukesh, 2011). The frequency of this disorder is on the rise globally, is likely to hit 300 million by 2025 with India projected to have the largest number of diabetic cases (Mohan, 2004).

The Indian traditional system of medicine prescribed plant therapies for diseases including diabetes mellitus called madhumeh in Sanskrit. Considerable interest for ethnobotanical community medications as they are recognized to contain valuable medicinal properties in different parts of the plant and a number of plants have shown varying degree of hypoglycemic and anti-hyperglycemic activity (Grover *et al.*, 2002). Experimentally, Shanmugasundaram *et al.*, (1990) confirmed the efficacy of traditional preparations claimed to be effective in the treatment of diabetics. Wide array of plant derived compounds with consistent antidiabetic activity have proven their possible use in the treatment of DM (Farnsworth, 1998).

Seshachalam has been empirical for its ethnomedicinal wealth (Madhava Chetty *et al.*, 2011). The tribals of Sheshachalam hill ranges are Irula, Yanadi, Sugali and Nakkala's and they have good knowledge of medicinal plants, diseases and treatment modalities. They have been using these parts in the form of juice,

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decoction, powder, paste, infusion and in crude form, with other additives like honey, cow milk, cattle milk, to relieve from different diabetic ailments. Documenting indigenous knowledge is important from the view point of conservation of biological resources and their sustainable utilization in the management of diabetics and its related complications. Therefore, present investigation on the use of ethnomedicinal plants for the treatment of diabetics has been taken up in Talakona and Tirumala hills, of Seshachalam forest of Chittoor district, Andhra Pradesh, India.

MATERIALS AND METHODS

Ethnobotanical survey

Field investigations were conducted in Seshachalam forest areas such as talakona forest (78° 8E, 13° 43'N), tirumala hills (79° 20'60E, 13° 14' 60N) of Chittoor District, Andhra Pradesh. In the present study, the methods suggested by Jain and Goel (1995) were adopted to survey the ethno botanical uses of medicinal plants, specimen collection, field Notes, processing of the material was followed according to the Standard protocol suggested by BSI. Identification of the collected plant specimens were done by plant taxonomist Madhava chetty, Sri venkateswara University, Tirupati and we followed standard literature (Gamble, 1935 and Madhava chetty *et al.*, 2011). There were informants with in the age 45 – 65 of different tribal groups. Among them two were tribal practitioner. The ethnobotanical data were collected using questionnaire, interviews and discussions in their local dialect.

RESULTS AND DISCUSSION

Present investigation indicates that seshachalam forest patches is blessed with splendid diversity of ethnomedicinal plants. Results depict that fresh plant materials were invariably preferred for the treatment of long term complications associated with diabetics. Field visits in talakona and tirumala hills at different forest folklore villages has been done. At the same time, we explored the forest around each village, and local experts showed us the plants known to them and described preparations of diabetic antidotes. Plant names were transcribed phonetically, mode of preparation of their medications with dosage, usage and prescribed medicinal plants by each specific ethnomedicinal practitioners of different tribes such as Yanadi, nakkal, sugali, irula and common herbal practitioners in tirumala hills and talakona have been documented in Table 1. During this prescribed medications and administration, eating sugar containing food stuffs is strictly prohibited. By using an empirical approach where the same specimens were shown in each village, we obtained replicate data sets. Ethnic people identified diabetics with some disproportionate disbalances in urinations like polyurea, smell in urine, gathering of ants where urine is passed. Our investigations claimed comparative data and also potential source for raw material for pharmaceutical products.

The tribal inhabitants revealed medicinal importance of 46 species belonging to 40 families have been studied in relation to diabetes and their complications should be studied further to find the efficacy and to prove scientifically in international standards for the benefit of the common man and to show the role of ethnomedicine as new vista for the treatment of diabetes is a practical, cost-effective and biologically safe. Furthermore experiments are carrying out with medicinal plants belonging to different families as mentioned above. More investigations must be carried out to evaluate the mechanism of action of medicinal plants with anti- diabetic effect. The toxic effect of these plants should also be elucidated.

Therefore active research on identification and isolation of anti-diabetic compounds from plants, their phytochemical studies as well as developing new areas where the likelihoods may be increased are in great need.

Further, The present investigation deep-rooted the benefits and traditional uses of medicinal plants with hypoglycemic effects and established some pharmacological evidence to support the folklore claim that it is used in the management and remedial of diabetes.

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Table 1: Tabulation showing ethnomedicinal investigations

S. No.	Plant name	Mode of preparation and dosage	Medication			Tribe
			M	N	E	
1	<i>Achyranthes aspera</i> L. Amaranthaceae	Dried leaf powder (2-3g) is given with water. Five fresh leaves taken daily in the morning for 30 days.	+	--	--	N,Y,I,H
2	<i>Aloe vera</i> (L.) Burm.f. Asparagaceae	Succulent stems (gel) are processed and taken with floral nectar and bee honey early hours.	+	--	--	ALL
3	<i>Andrographis paniculata</i> (Burm.f.) Nees Acanthaceae.	Leaf decoction is given with jaggery water. Seven fresh leaves are prescribed daily in the morning for 15 days.	+	--	--	ALL
4	<i>Annona reticulata</i> L. Annonaceae	Leaf juice mixed with 150 ml boiled cow milk and given two times daily upto five months.	+	--	+	Y,N,H
5	<i>Asparagus racemosus</i> Willd. Asparagaceae	The filtered extract is given along with 5g of jaggery daily for two months.	+	+	+	H,Y,I
6	<i>Azadirachta indica</i> A.Juss. Meliaceae.	Leaves made into pills and consumed in early hours. Six seeds of the plant made into a paste with 50 ml rice wash and 5 ml of ghee should be given after meal in case of long standing diabetes.	+	--	+	ALL
7	<i>Boerhaavia diffusa</i> Linn. Nyctaginaceae	The raw leaf juice (10 ml) is used and also advised to take the leaves and tender branch tips as vegetables.	--	+	+	I,S,N
8	<i>Cinnamomum verum</i> J.Presl Lauraceae	Leaf powder (2-3gm) with one glass of milk given daily is effective within a short period.	+	--	--	H,N
9	<i>Citrullus colocynthis</i> (L.) Schrader. Cucurbitaceae.	Fruits with mixture of pepper, salt taken at any time in daily diet.	+	+	+	Y,I,H
10	<i>Cucumis sativus</i> L. cucurbitaceae	Fruits taken at any time .Seeds (2g) made into paste with liquorice (<i>Glycyrrhiza glabra</i>) is given daily for 15 days.	+	+	+	H
11	<i>Coccinia grandis</i> (L.) Voigt Cucurbitaceae	Fresh leaves grinded mixed with boiled cattle milk .	+	+	+	H,S
12	<i>Corallocarpus epigaeus</i> (Rottler) C.B.Clarke Cucurbitaceae.	The fresh root used with water and made a paste and consumed orally or the fresh leaf with fruit mix in water given orally	+	--	+	I,N,H
13	<i>Dillenia indica</i> L. Dilleniaceae)	Fruit ground to chutney (<i>Tamarindus</i> , <i>Capsicum</i> , <i>Allium sativum</i> mixed equally and prepared) taken with meal.	--	+	+	H,I
14	<i>Eucalyptus globulosus</i> St.- Lag. Myrtaceae.	Fresh leaves squashed mixed with <i>Coriandrum</i> leaf paste and taken early hours	+	--	--	ALL
15	<i>Ficus religiosa</i> L. Moraceae	Ripened fruits made into paste mixed with jaggery taken before going to bed.	--	--	+	Y,N,H
16	<i>Gymnema sylvestre</i> (Retz.) R.	Half a teaspoon leaf powder with pinch of jaggery powder mixture taken orally was	+	--	+	ALL

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	Br. Asclepiadaceae	given daily for 30 days.				
17	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult. Apocynaceae	Root tonic given early morning with 2-3 tea spoonful with honey .Root decoction given in early morning (glass pot full prescribed)	+	--	--	ALL
18	<i>Hibiscus rosa-sinensis</i> L. Malvaceae.	Leafs grinded and aqueous extract mixed with <i>Hemidesmus</i> is taken a glassful continued for 2 – 3 Months	+	+	+	Y,H ,N
19	<i>Hiptage benghalensis</i> var. <i>benghalensis</i> Malpighiaceae	Decoction of the Leaf extract with <i>Allium sativum</i> bulbs in little proportion	--	+	+	ALL
20	<i>Lagerstroemia speciosa</i> (L.) Pers. Lythraceae	Bark dissolved in water in full night ,taken with empty stomach	+	--	--	Y,I,S
21	<i>Litsea glutinosa</i> (Lour.) C.B. Rob. Lauraceae	Fruits (unripe and riped in 1:1 gm) crushed made into paste consumed with honey or jaggery .	+	+	+	H,S
22	<i>Magnolia champaca</i> var. <i>champaca</i> Magnoliaceae	Flowers are grinded in water and consumed directly with some additives such as <i>Emblica</i> , <i>Phyllanthus</i> and <i>Tamarindus</i> .	+	--	+	N,Y,H
23	<i>Mangifera indica</i> L. Anacardiaceae	Leafs grinded and aqueous extract is taken a glassful .continued for 2 – 3 Months.	+	--	+	N,H
24	<i>Memecylon scutellatum</i> (Lour.) Hook. & Arn. Melastomataceae	Fruits taken as daily consumption.	+	+	+	Y,I,H
25	<i>Mentha spicata</i> subsp. <i>spicata</i> Lamiaceae	Whole plant is emasculated and extracted in water ,taken in early hours and before sleep .	+	--	+	ALL
26	<i>Morinda citrifolia</i> L. Rubiaceae.	Flowers and unripe fruits mixed with 100 ml of cow milk and dose was continued for 5 weeks	+	--	+	Y,S
27	<i>Moringa oleifera</i> Lam. Moringaceae	Fruit juice (15-20 ml) along with little old jaggery given once daily for 15 days. Advised to take fruits and flower and leaves as vegetables in daily diet .	+	--	+	ALL
28	<i>Murraya koenigii</i> (L.) Spreng. Rutaceae	Fresh leaves juice taken directly, used in regular diet for 2- 3 weeks occasionally in 3-4 months.	--	+	+	Y,I,N
29	<i>Musa × paradisiaca</i> L. Musaceae	Psuedo stem used as vegetable in daily diet.	--	+	+	Y,S,I
30	<i>Ocimum sanctum</i> L. Lamiaceae	1:1 ratio of thulasi and neem leaf paste. Whole plant juice of 15-20mL with 2 drops of honey is given twice a day for 15 days.	+	--	+	ALL
31	<i>Phoenix loureiroi</i> Kunth Arecaceae	Fruits are taken as additional diet .	+	+	+	Y,H,S
32	<i>Phyllanthus emblica</i> L. Phyllanthaceae	A paste (100g) made out of the boiled unripe fruit and equal quantity of fine rice, given with normal meal for 2-4 months	--	+	+	Y,I,N
33	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Fresh fruits taken with pepper for flavour.	+	+	+	ALL

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34	<i>Piper nigrum</i> L. Piperaceae.	The whole plant is made into paste. About 15g of paste given with old jaggery twice a day for 3 weeks to check the excessive urination.	--	+	+	S,H,I
35	<i>Psidium guajava</i> L. Myrtaceae.	Leaf decoction with tamarind and pepper mixed tonic.	--	+	+	Y,I,N
36	<i>Pterocarpus marsupium</i> Roxb. Leguminosae	Heart wood soaked overnight with water and filtrate (10mL) is given daily for one month. Both bark and heart wood is effective	+	+	+	Y
37	<i>Sida cordata</i> (Burm.f.) Borss.Waalk. Malvaceae	Leaf juice (20 mL) mixed with 1-2 spoons honey given once daily for one Month.	+	--	--	H,N,I
38	<i>Sophora interrupta</i> Bedd. Leguminosae	Leaf extract taken with 1:1 ratio of <i>ocimum</i> and <i>coriandrum</i> paste.	+	--	--	H,U,Y
39	<i>Syzygium alternifolium</i> (Wight) Walp. Myrtaceae	Fruits taken directly. However, the seed powder (4-6 gm) given twice daily is more effective than the fruit.	+	+	+	Y,N
40	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn. Combretaceae	Bark immersed in hemidesmus root tonic, preserved overnight given for 2 – 3 months in acute problems.	+	+	+	H,N,Y
41	<i>Tinospora cordifolia</i> (Willd.) Miers Menispermaceae	The leaves were crushed and (L.) Sweet the juice was given orally. 1.5ml of the juice was given once daily.	+	--	--	ALL
42	<i>Trigonella foenum-graecum</i> L. Leguminosae.	The seed was crushed the juice was taken as tonic with vegetable juice.	+	--	+	S,H,I
43	<i>Ventilago maderaspatana</i> Gaertn. Rhamnaceae	Seeds used in curries ,taken directly with milk or water.	+	+	+	S,N,H
44	<i>Vernonia anthelmintica</i> (L.) Willd. Compositae	Stem powder (5g) of this plant and 2-3g of long pepper powder (<i>Piper longum</i>) are prescribed for 7 days.	+	+	+	ALL
45	<i>Zingiber officinale</i> Roscoe Zingiberaceae)	Rhizomes dried and powdered mixed in curries ,soups in little proportions , taken with milk with empty stomach	+	+	+	ALL
46	<i>Ziziphus jujuba</i> var. <i>Jujube</i> . Rhamnaceae	Fruits are directly consumed without any medicaments and dosage	+	--	+	Y,I,S
Significance of symbols : Medications : M –Morning,N- Noon, E- Evening. Tribes : I – Irula,Y-Yanadi ,N –Nakkala,H – Herbal Practitioner prescription ALL – all the tribal doctors and herbal practitioners suggested ; + refer to dosage to be taken , -- indicates “not necessary”						

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