

Survey of plants having antidiabetic activity from Pune district of Maharashtra state

■ M.K. DESALE AND P.B. BHAMARE

SUMMARY

The present compilation gives an account of plants of Pune district of Maharashtra state, which are used for diabetes. Pune is inhabited by tribals, local non-tribals. It is knowledge hub and dominated by Ayurved loving population. Naturally source of medicinal plants is also rich in the packets of Bhimashankar, Purandhar, Parinche, Junnar, Lonavala-Khandala, Velha. A study on the ethnomedicinal plants of Pune district was carried out. Through questionnaire, personal interviews and conversation, a total number of 41 plant species used by the aboriginals to treat diabetes were enumerated. The major ethnic group present in this area include Mahadev Koli, Thakar, Koraku, Dhangar, Gujar etc. During the investigation, a well-known developed system of ethnomedicinal practices was found to exist among these ethnic groups. The family Solanaceae was having maximum number of medicinal plants used by the ethnic groups followed by Liliaceae and Asclepiadaceae. The major plant parts used was constituted by seed followed by leaves, root and stem.

Key Words : Ethnomedicine, Tribals, Antidiabetic medicinal plant

How to cite this article : Desale, M. K. and Bhamare, P.B. (2012). Survey of plants having antidiabetic activity from Pune district of Maharashtra state. *Internat. J. Plant Sci.*, 7 (2) : 328-331.

Article chronicle : Received : 19.03.2012; Revised : 15.05.2012; Accepted : 31.05.2012

Many ethnomedicinal surveys on medicinal plants used by ethnic population have been performed in different parts of the country. Several plant species have been reported to be antidiabetic. These include *Trigonella foenum graecum*, *Mimordica charantia*, *Ficus bengalensis*, *Gymnema sylvestre*, *Allium sativum* and Aloe vera. Many of them seem to act directly on pancreas and stimulate insulin level in blood. This study aims to provide a comprehensive review on various plant species from biosphere of Pune, which have been shown to display the potent in ethnic group and antidiabetic activity.

Diabetes is caused by inherited deficiency in production of insulin by the pancreas or by the ineffectiveness of the insulin produced. Such irregularities results in increased

concentration of glucose in the blood, which in turn damage heart, kidney, eyes. Many herbal medicines have been recommended for the treatment of diabetes. Medicinal plants used for the treatment of diabetes are inexpensive easily available and without side effects. Some of the medicinal plants are found to use in traditional system of medicine from hundreds of years in many countries of the world.

The ethical drug approved for the treatment of patient, which derived from a medicinal plants *Gymnema sylvestre* historically used for treatment of diabetes in ancient Indian territory.

According to WHO (1980) more than one million people rely on herbal medicines to some extent. The WHO has listed 21000 plants which are reported as medicinal plants. India has rich medicinal plant flora of some 25000 species of these 1500 species are commercially used for drug formulation. It is 1500 BC old practice. Medicine culture of India is really very rich. The references in Atharvaveda (Ayurveda) (Parwardhan *et al.*, 2004; Chikitsasthana and Sharma, 1983; WHO, 1980) list long back our textual evidence of tradition of use of medicinal plants that is more than 3000 years old. Researchers have aimed at identifying plant derived substances for the treatment

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :

P. B. BHAMARE, Department of Botany, Jaihind College, DHULE (M.S.) INDIA

Address of the Co-authors:

M. K. DESALE, Bharati Vidyapeeth Deemed University, PUNE (M.S.) INDIA

of various diseases. It is estimated that more than 25-35 per cent of modern medicines are plant derived. Ayurveda has a 5000 years old rich heritage of role of the use of plants in the treatment of various diseases. The ethnobotanical information reports about 8000 plants that may possess anti-diabetic potential. The possible use in the treatment of diabetes mellitus (DM). DM can be defined as a group of syndromes characterized by hyperglycemia altered metabolism of lipid carbohydrates and proteins along with an increased risk of vascular disease. Diabetes is thus a chronic disorder of metabolism. Its primary characteristic is a high level of sugar in the body in the fasting and post meal stages. In this abnormal stage due to inadequate insulin and its inadequate action the glucose become excess in the blood. Insulin and glucoses are important hormones involved in the maintenance of diabetes.

Diabetes is caused due to loss of balanced effect of above hormones, usually due to less insulin production. Sugar starts accumulating in the blood and blood sugar level increases and sugar passes in urine along with other minerals. High blood sugar level is known as hyperglycemia and the presence of sugar in the urine is known as glycosuria. Insulin is secreted by β -cells of islets of Langerhans of pancreas. DM is a group of syndromes characterized by polydipsia, polyuria and glycosuria. Diab means to pass through, mellitus means sweetened with honey.

In Indian scenario, diabetes is referred as Madhumeha a type of prameha. Detailed description of Madhumeha is available in Charak samhita, Sushruta samhita and Vagbhata. In Astanghruday (600 AD) clear definition of Madhumeha is given. According to Indian Council of Medical Research (ICMR), it had reported a prevalence of 2.3 per cent in the

urban and 1.5 per cent in the rural areas. The estimated burden of diabetes in India was (Kiritkar and Basu, 1933; Mehta, 1982; Patil, 2003).

22 million in 1990

28 million in 1995

33 million in 2000

It is continuously growing but adequate treatment is often not available. People at large say that soon India will become a capital of diabetes. In the present study efforts are made, how Pune people are getting ethno medicines to cure the diabetes.

MATERIALS AND METHODS

A survey of ethnomedicinal plants was carried out in the period of July 2009 to December 2011 Questionnaire was developed. Interviews and schedules were conducted. Informants, vaidyas, medicinal plant dealers, patients and traditional practitioners were requested to opine on ethno medicinal plants which are used to cure diabetes. This group has opined free and frankly about all the medicinal plants. Plants parts were recorded, specimens were examined with the help of senior researchers in the field of ethno medicines, herbal dealers and Ayurvedic practitioners. All the observations were recorded and data were kept ready for further analysis.

A list of 45 potential anti-diabetic plants is presented in Table A. The scientific name, vernacular name, family and formulations used to treat diabetes by traditional practitioners and dealers are presented in the Table A.

RESULTS AND DISCUSSION

The study reports the anti-diabetic activity of

Table A : Showing details of medicinal plants with anti-diabetic activity

Sr. No.	Name of the plant, family, Local name of the plant	Plant part used and administrative of the drug to cure diabetes
1.	<i>Acacia arabica</i> (Mimosaceae) Bhabhul	Seeds are powdered, and used in complex churn. 1-2 g is given in the morning for 2 weeks.
2.	<i>Acacia catechu</i> (Mimosaceae) Khair	Bark is powdered and used in complex churn. 1-2 g are given in the morning for 2 weeks.
3.	<i>Allium cepa</i> (Liliaceae) Kanda	Cataphylls of the bulb are expressed into juice (5 ml) which is useful in reducing blood sugar levels for 2 weeks.
4.	<i>Cassia auriculata</i> (Caesalpinaceae) Ahvin	Seeds are powdered and used in ingredient of complex churn. 1-2 g is given in the morning for 2 weeks.
5.	<i>Cryptostegia grandiflora</i> * (Asclepiadaceae) Rubber	Whole plant is powdered and used as ingredient of complex churn. 1-2 g is given in the morning for 2 weeks.
6.	<i>Ficus bengalensis</i> (Moraceae) Wad	Bark is powdered and used as ingredient of complex churn. 1-2 g is given in the morning .
7.	<i>Gymnema sylvestre</i> (Asclepiadaceae) Madhupani-Bedaki	Leaves are powdered and used in ingredient of complex churn. 1-2 g is given in the morning. 1-2 g of powder of leaves is used in milk / tea preparations in the morning only.
8.	<i>Murraya koenigii</i> (Rutaceae) Kadhineem	1-2 g of powder of leaves is given in noon.
9.	<i>Pinus roxburghii</i> (Pinaceae) Devdar	Bark-stem powder is used as ingredient of complex churn 1-2 g is used in the morning for 2 weeks.

Table 1 : Contd.....

Table 1 : Contd.....		
10.	<i>Syzygium cumini</i> (Myrtaceae) Jamun	Seed powder is used as ingredient of complex churn 1-2 g is given in the morning for 2 weeks
11.	<i>Tephrosea purpurea</i> (Fabaceae) Nil	Seeds powder is used as ingredient of complex churn 1-2 g is given in the morning for 2 weeks.
12.	<i>Tinospora cordifolia</i> (Menispermaceae) Gulwel	Stem powder is used as ingredient of complex churn 1-2 g is given in the morning for 2 weeks.
13.	<i>Clerodendron serratum</i> (Verbenaceae) Aarni / Bharangi	Whole plant powder is used as ingredient of complex churn 1-2 g is given in the morning for 2 weeks.
14.	<i>Aegel marmelos</i> (Rutaceae) Bel	25 ml of juice of leaves is given in the morning for 2 weeks.
15.	<i>Azadirachta indica</i> (Meliaceae) Neem	Juice of leaves, bark and flowers are used as ingredient of complex churn and 1-2 g is given in the morning.
16.	<i>Butea monsperma</i> (Fabaceae) Palas	Flowers are kept in water for overnight and water is taken every day in the morning for 1-2 months.
17.	<i>Madhuca indica</i> (Sapotaceae) Mahu	Bark decoction is given once a day for a week.
18.	<i>Pterocarpus marsupium</i> Roxb (Fabaceae) Vijaysar	Wood is immersed in water and it is taken everyday in the morning for 1-2 months.
19.	<i>Trigonella foenum garecum</i> (Leguminosae) Methi	5 g of seed powder is given with milk once a day for 2 weeks. Seeds are immersed in water and it is taken once a day for a week.
20.	<i>Aloe vera</i> (Liliaceae) Korphad	2-5 g of mucilaginous gel is swallowed once a day for 2 weeks.
21.	<i>Cinnamomum tamala</i> (Lauraceae) Rankalam	Bark is powdered 1-2 g is given with warm water once a day in morning for 1-2 weeks.
22.	<i>Clitoria ternala</i> (baceae) Gokarna	Roots are powdered, 1-2 g powder is taken in the morning for 1-2 weeks.
23.	<i>Catharanthus roseus</i> (Apocynaceae) Sadaphuli	5 ml of decoction of whole plant.
24.	<i>Curcuma longa</i> (Zingiberaceae) Halad	1-2 g of powder of rhizome is taken with warm water in the morning for 1-2 months.
25.	<i>Biophytum sensitivum</i> (Oxilidaceae) Lajja	1-2 ml of leaf extract is taken in the morning for a week.
26.	<i>Bombax ceiba</i> (Bombaceaceae) Savar	1-2 g leaves powder is taken in the morning for a week.
27.	<i>Brassica juncea</i> (Brassicaceae) Mohari	Oral feeding of mohair in diet for 1-2 months.
28.	<i>Caesalpinia bonducella</i> (Caesalpinaceae) Sagargota Latakaranj	1-2 g of fruit powder is taken in the evening for 2 weeks used as ingredient of complex churn.
29.	<i>Cajanus cajan</i> (Leguminosae) Tur	5 g of roasted seeds are swallowed in the morning for 2 weeks.
30.	<i>Allium sativum</i> (Liliaceae) Lasun	2-3 cataphylls of the bulb are swallowed at noon for 1-2 months.
31.	<i>Swertia chirayita</i> (Gentianaceae) Kadu chirayat	5-10 ml of decoction of whole plant is taken in the morning for 1-2 months.
32.	<i>Ficus carica</i> (Moraceae) Anjir	5 ml of extract of fresh leaves is taken in the morning for 2 weeks.
33.	<i>Artocarpus heterophyllus</i>	5-10 ml decoction of whole plant is taken in the evening for 2 weeks.
34.	<i>Nelumbo nucifera</i> (Nymphaeaceae) Kamal	5 g of Rhizome are taken in the morning for 2 weeks, Different recipe are swallowed.
35.	<i>Punica granatum</i> (Punicaceae) Dalimb	Flowers and seeds are dried and powdered. 1-2 g of powder is taken in the morning for 1-2 weeks.
36.	<i>Pandanus odoratus</i> (Pandanaceae) Kevada	Roots are crushed 1-2 g of extract is taken at noon time for 1-2 weeks.
37.	<i>Magifera indica</i> (Anacardiaceae) Amba	5 ml of leaf extract is taken in evening for 1-2 months.
38.	<i>Balanites aegyptiense</i> (Balanitaceae / Simrubiaceae) Hinganbet	2-5 ml of aqueous extract of mesocarps of the fruit is taken in the morning for 1-2 months.
39.	<i>Withania somnifera</i> (Solanaceae) Askand	5 g of root powder is taken twice a day of 1-2 months.
40.	<i>Boerhavia diffusa</i> (Nyctaginaceae) Punarnava	5 ml of aqueous leaf extract is taken in the morning for 1-2 weeks.
41.	<i>Artemisia pallens</i> (Asteraceae) Dawana	1-2 g of whole plant powder is taken in the morning for 1-2 months.
42.	<i>Selaginella tamarascina</i> (Selaginaceae) Sanjivani	1-2 g of ariel part is immersed in water and taken once a day for 2 weeks.
43.	<i>Lupin marmalades</i> (Fabaceae)	5 ml of whole plant decoction is taken in the evening for 1-2 weeks.
44.	<i>Hibiscus rosa sinensis</i> (Malvaceae) Jaswad	1-2 ml of leaf extract is taken in the morning for 2 weeks.
45.	<i>Lantana camera</i> (Verbenaceae) Ghaneri	1-2 ml of leaf extract is taken in the morning for 2 weeks.

ethnomedicinal plants. The phytochemical analysis mainly shows flavonoids, sterols, triterpenoids tannin phenolic. The aim of the present study was to record potential ethnomedicinal plants which are known in traditional herbal medicinal practices used for the treatment of diabetes. Vaidya follow these plants as local pharmacopoea for the treatment of diabetes. Interviews with some of the patients throws light on the uses of ethnomedicinal plants and medical advice of the vaidya for developing life-style in the diabetic sufferings. Flavoroids and polyphenols present into such plants have been reported to contribute to antidiabetic activity.

Conclusion :

This survey highlights the uses and importance of ethnomedicinal plants in the treatment of diabetes. *Gymnema sylvestre*, *Aloe vera*, *Curcuma longa*, *Catharanthus roseus* are known for their antidiabetic property. Studies to isolate the bioactive principles from these plants are required.

Acknowledgement :

The authors are thankful to the Department of Botany of Y.M. College, Pune and Jaihind College, Dhule for their help in procuring the plant samples and the Botanical Survey of India (BSI) regional office Pune for authentication of collected plant samples, authors are grateful to Prof. (Dr.) Shivajirao Kadam, Vice-Chancellor, Bharati Vidyapeeth Deemed University, Pune and Prin. K.D. Jadhav, Y. M. College, Pune for encouragements and facilities. Authors are also thankful to all the knowledge providers, (vaidya, Herbal healers) Ayurvedic practioners, medicinal plant dealers who have provided valuable information of traditional medicines. Authors thankfully make a mention of Ayurvedic practioners Dr. Kiran Desale, Dr. Sameer Jamdagni and Dr. (Mrs.) Shrawani Desale for their whole hearted assistance in this research study.

REFERENCES

Chikitsasthana and P.V. Sharma (1983). *Charaka samhita* – Vol. II. Chaukhamba Orientalia, Varanasi (U.P.) INDIA, 118pp.

Dubey, D.K., Biswas, A.R. and Bapna, J.S. (1987). Hypoglycaemic and antihyperglycaemic effect of *Mordica charantia* seed extract in albino rats. *Fitoterapia*, **58**(6): 387-390.

Hooker, J.D. (1872). *The flora of British India*, Vol. 1-6, London : Reeve and Co., 97pp.

Jain, S.K. (1991). *Dictionary of Indian folk medicine and ethnobotany*. Deep Publications, NEW DELHI, INDIA.

Karnick, C.R. (1972). Some aspects of crude Indian drugs plants used in Ayurvedic system of medicine (Madhumeha) (Diabetes). *Acta Phytother Amst.*, **29**:141-144.

Kirtikar, K.R. and Basu, B.D. (1933). Indian medicinal plants, 2 nd Ed., Vol. 1 – 4, Allhabad : LM Basu Pess.

Khan, A., Safdar, M., Khan, M. M. A., Khattak, K. N. and Anderson, R. A. (2003). Cinnamon improves glucose and lipids of people with type 2 diabetes, *Diabetes Care*, **26** (12): 3215-3218.

Lai, B.N. and Chaudhuri, K.D. Observations on *Momordica charantia*, Linn. (Kanvelak) and *Eugenia jambolana* (Jamboo) as oral antidiabetic remedies. *J. Res. Indian Med.*, **2** (2): 161-164.

Mehta, K.C. (1982). Indian herbal drugs in the treatment of diabetes. *Curr. Med. Pract.*, **26**(10): 305-308.

Nadkarni, M. (1954). *India material medica*, Popular Book Depot, Mumbai (M.S.) INDIA.

Patil, D.A. (2003). *Flora of Dhule and Nandurbar District*, Maharashtra. Bishen Singh Mahendra Pal Singh, Dehradun (UTTARAKHAND) INDIA.

Parwardhan, B., Vaidya, A.D.B. and Chorghade, M. (2004). Ayurveda and natural products drug discovery, *Curr. Sci.*, **86** (6):789-799.

Puri, D. (2001). The insulinotropic activity of a Nepalese medicinal plant. *Biophytum sensitivum: preliminary experimental study. J. Ethnopharmacol.*, **78**:89-93.

Shrotri, D.S., Kelkar, M., Deshmukh V.K. and Aiman, R. (1963). Investigations of hypoglycaemic properties of *Vinca rosea*, *Cassia auriculata* and *Eugenia jambolana*. *Indian J. Med Res.*, **51** (3): 464-468.

Singh, V.S. and Pandey (2000). *Ethno botany of Rajasthan*.

Sushrut samhita Ci. 11:

WHO (1980). Expert committee on diabetes mellitus: second report, World Health Organ. *Tech. Rep. Ser.*, **646**:1-80.

