

Cure of Diabetes by Some Indigenous herbal formulations

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ABSTRACT

Diabetes is one of well known widespread disease of modern times. Not only the elder persons but even the youth, infants and children are suffering from it in entire world including India. This disease is caused due to the imbalance of insulin hormone secreted by beta cells of Langerhans of pancreas gland, resulting in excess of sugar in blood. Since ancient times, a wide range of plants and plant products are being used for the treatment of diabetes in India. A wide use of local, indigenous ethnomedicinal and folk medicines and household remedies is prevalent in India since ancient times. These remedies are used by the healers, local informers and people in general with great belief. The present study is based on the utility of herbal formulations for curing diabetes. These herbal formulations are based on different parts of 34 plant species of 21 families. The scientific and local names, English names, families of these plants along with method of usage are described in the study.

Key words – Diabetes, indigenous medicines, ethnomedicinal, household remedies.

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INTRODUCTION

Diabetes is a well acquainted disease of modern times. It is spreading vigorously worldwide including in India. Modern lifestyle, changing food habits, cold drinks, increasing dependency on fast and junk foods, lack of exercise and uncertain daily routine are the most important factors causing this disease to increase and spread by leaps and bounds. The dangerousness of diabetes can be easily understood by the fact that once a disease thought to be the result of luxurious lifestyle, old age and urban area is now affecting poor people, those living in rural and backward areas and people of all age groups in suburbs. Along with old and aged people, children and youth are also being affected now by this disease.

According to an assumption, 200-250 million people around the globe are diabetic, out of which 35-40 million are only in India. According to WHO, the rate at which diabetes is increasing in India day by day, it can be said that during the next 20 years India will have the most number of diabetic patients in the world. How fast is diabetes spreading, can be understood by the fact that in every 15-20 days, a new medicine for diabetes is launched in the market [1-4].

During the digestive process, the food material in the human body breaks up into sugar (glucose), which increases the level of blood sugar in the blood. In every human being, there exists a pancreas gland. This is an oval, auricular gland light pink in color, which is found in the upper gastric antrum in the upper left quadrant. It is situated amid duodenum and spleen right below the stomach. The stomach can be divided into four parts – head, neck, trunk and the tail. The pancreas gland is both internal and external secretory gland. Its external secretory part secretes enzymes, which help in digestion. Its internal secretory part is also called 'Islets of Langerhans'. These islets are formed by three types of epitheloid cells, also known as alpha, beta and gamma cells. The beta cells secrete a polypeptide hormone

named insulin. This insulin transports the sugar found from the food to the various organs of the body. The sugar is used by the cells to produce energy in order to perform necessary activities of cells and the body. When the secretion of insulin in the body is ceased due to any reason, or the cells fail to accept it, the sugar acquired from the food is unable to reach to the cells of the tissues; on the other hand, the level of sugar in the blood rises consequently. This affects the activities of the organs of the body. This condition is known as Diabetes or the sugar disease.

Generally, diabetes is of two types. The first one is Juvenile or Type-I diabetes, and the second is Adult or Type-II diabetes. The person suffering from Juvenile or Type-I diabetes has to depend on the insulin totally. This type of diabetes (Juvenile) usually affects the persons of less than 20 years age. In Juvenile diabetes, 'beta cells of Langerhans' secreting insulin, are destroyed completely or they discontinue to secrete insulin. The patients suffering from this type of diabetes are 7-10%. In the person suffering from Type-II or Adult diabetes, the insulin is not secreted as per the need of the body, or the cells of the body fail to use the insulin secreted by the 'beta cells of Langerhans'. Due to this, the sugar balance in the blood is affected. About 90% diabetic persons suffer from this type of diabetes [6].

As the sugar is not absorbed and used by the body, fat and protein starts to be used as the source of energy in the body of the patient. As a result, the metabolism of the whole body is affected. Due to the rising level of sugar in the blood, other organs of the body also get affected. The major ailments in the body caused due to diabetes are – retinopathy, nephropathy, neuropathy and cardiac disorders.

In retinopathy, due to raised level of sugar in the blood, small arteries of the eyes are affected, which cause damage to the retina, as a result, the vision of the patient is affected, and he or she can get blind. Nephropathy is the main aftermath of the diabetes. The function of kidneys is to remove detrimental and unwanted elements from the blood. The kidneys of a diabetic person suffer extra workload due to the raised level of sugar and ketones. As a result, their work efficiency is affected up to a large extent [5].

Neuropathy occurs in the tyrannical condition of diabetes. Because of this, the neurons become incapable or non-functional, and a part of the body particularly legs and consequently the body's ability to feel injury or pain comes to an end. Not only even small wounds take a very long time to get aright, but the condition of cutting the injured limbs can also arrive. Diabetic patients are more vulnerable to cardiac diseases as compared to other persons.

The raised level of sugar in the blood also affects the level of cholesterol. As a result, because of contraction or blockage of arteries, the blood supply in the body is also affected. Due to this, problems like high blood pressure, insomnia, heart attack or heart failure are more likely to occur. As compared to a normal person, a diabetic patient is 25 times more likely to suffer blindness, 17 times more likely to suffer from nephritis, up to 30 times more likely to be neurotic and 5 times more likely to suffer from a heart disease [7-9].

Since ancient times in India, flora is being used for the treatment of diabetes. According to epics, King *Dileep*, the ancestor of Lord *Rama* once also suffered from diabetes. According to one another story, Lord *Ganesha* became diabetic by consuming lots of *modaks* (rounded sweets dish) presented by his devotees. His father Lord *Shiva* then advised him to go and dwell in the *Jamun* forest. Obeying to his father, Lord *Ganesha* lived in *Jamun* forest for the period of one year. During this period, he only fed on *Jamun* leaves, *Jamun* fruits and *Jamun* seeds, and got rid of diabetes. Since then, all the materials devoted to Lord *Ganesh* such as *Doorva* (*Cynodon dactylon* (L.) Pers.), *Jamun* (*Eugenia jambolana* Linn.), *bel* (*Eagle marmelos* L. Corr.), *Haldi* (*Curcuma longa* L.), *Methi* (*Trigonella foenum-graecum* Linn.) etc. have the qualities of antidiabetic. These stories prove that the Indians were familiar with diabetes since ancient times.

Ancient Indian *Ayurvedacharyas* like Charak, Sushrut, Nagarjun, Bhoj, Baagbhatt, Sharangdhar etc. have described in detail the reasons, symptoms and treatment in their books. According to *Ayurvedic* doctrine, diabetes is classified as *prameha*. It is assumed as one of the 20 type of *prameha*. The *prameha* if not treated properly, turns into *Madhumeha* (diabetes), which is the most dangerous condition of a *prameha*. In ancient India, the Indian *Ayurvedacharyas* saw ants collecting on the urine of person suffering from this disease, and hence they called it *Madhumeha*.

Various medicinal plants are being used to cure diabetes since ancient times in India. Among these the principal flora are Jamun (*Eugenia jambolana* Linn.), Neem (*Azadirachta indica* A. Juss.), Gudmaar (*Gymnema sylvestre* Linn.), Bel (*Aegle marmelos* L. Corr.), Meetha Neem (*Murraya Koenigii* Linn.), Karela (*Momordica charantia* Linn.), Giloe (*Tinospora cordifolia* (Willd) Miers ex Hook. f. & Thoms), Amla (*Embelica officinalis* Gaertn.), Haldi (*Curcuma longa* Linn.), Tulsi (*Ocimum sanctum* Linn.), Methi (*Trigonella foenum-graecum* Linn.), Sadabahar (*Catharanthus roseus* (L.) G. Don.) etc. Apart from *Ayurveda*, various domestic, local and ethno-medicinal techniques for the treatment of diabetes are also carried out successfully by the common habitants with great belief [10-11.] The present study is based on the effect of ethno-medicinal methods of treatment on diabetes.

MATERIAL AND METHODS

A number of field survey trips were organized in order to get the report of anti-diabetic utility of specific plants in central part of Uttar Pradesh especially in Farrukhabad, Kannauj, Kanpur and Kashiram Nagar. The information was collected from different localities, forest patches, plantations, fields, gardens, urban, semi-urban, rural and remote areas of these districts with the help of local vaidyas, hakeems, old aged villagers, local conservator persons, hermits, herbal cultivators, sailors, non-medico practitioners, sapers, Ayurvedic and Unani practitioners and other informants. The information about the habitat of these plants and the persons who have used them as an anti-diabetic successfully was collected. The anti-diabetic utility of these plants along with their local and botanical names, families and mode of preparation of medicines was documented. The anti-diabetic qualities of these plants were cross-checked through the available literature. Photographs of plants and specimens were also deposited by research group.

RESULT AND DISCUSSION

The study has been conducted during December 2008 to June 2011. During the course of this study, 34 plant species belonging to 30 genera of 21 families with anti-diabetic properties were identified. The study is based on qualitative and quantitative data. Identified plant species are arranged in Table no.1. It deals with botanical names, families, local (Hindi) names, English names, useful parts and methods of utilization. All the 34 plant species belonging to 30 genera of 21 families have been recorded. Out of these, 18 plant species were perennial (14 trees and 4 shrubs) and 16 were annual. 29 genera of 18 families were dicots and 5 genera of 3 families represent monocots. Cucurbitaceae and Rutaceae were dominant families which represented 4 plant species each. They were followed by Papilionaceae, representing 3 families. Meliaceae, Myrtaceae, Moraceae, Alliaceae, and Zingiberaceae represented 2 species each. Solanaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Lamiaceae, Asteraceae, Annonaceae, Euphorbiaceae, Poaceae, Caesalpiniaceae, Menispermaceae, Malvaceae and Moringaceae represented single species each. Most of the plants occur throughout the year and used for their antidiabetic properties with high reliability [11-16].

For their antidiabetic properties, fresh leaves of plants like *Aegle marmelos* L. Corr., *Annona squamosa* L., *Azadirachta indica* A. Juss., *Eugenia jambolana* L., *Ficus benghalensis* L., *Gymnema Sylvestre* (Retz.) R. Br., *Murraya koenigii* L. Sprang., *Solanum nigrum* L., etc. are prescribed to chew twice or thrice everyday according to the condition of disease. Juice of fresh leaves of *Andrographis paniculata* (Burm. F.) Wall Ex., *Azadirachta indica* A. Juss., *Cajanas cajan* (L.) Millsp. *Catharanthus roseus* (L.) G. Don., *Cynodon dactylon* (L.) Pers., *Moringa oleifera* Lam., *Vicia feba* L. is prescribed to be taken orally in diabetes.

Fruit juice of *Momordica charantia* L., *Lagenaria vulgaris* L., *Citrus aurantifolia* (Christn.) Swingle, *Cucumis sativus* L. is useful to cure diabetes. Leaf's latex of *Ficus benghalensis* L. and juice of Corm of *Allium cepa* L. is also effective in the early stages of diabetes. Fruit juice of *Eugenia jambolana* L. is also prescribed to be taken throughout the season. Cooked leaves (aerial parts) of *Solanum nigrum* L., *Trigonella foenum-graceum* L., cooked tubers of *Helianthus tuberosus* L. and *Allium sativum* L., cooked seeds of *Cajanas cajan* (L.) Mill sp. are useful in diabetes.

Decoction of dry leaves of *Psidium guajawa* L. Jamb., decoction of leaves and stem of *Tinospora cordifolia* (Willd.) Miers ex Hook. F. & Thoms is prescribed by the traditional

healers to cure diabetes. Decoction of shadow dried fruit skins of *Citrus aurantium* L. is also prescribed [19-23].

Dry fruit powder of *Momordica charantia* L., *Melia azedarach* L., *Embllica officinalis* Garten. *Ficus glomerata* L. is used in diabetes with high reliability. Seed powder of *Momordica charantia* L., *Trigonella foenum-graecum* L., *Eugenia Jambolana* L., *Tamarindus indica* L., *Gossypium arboreum* L. is prescribed by the local healers in diabetes. Dry roots powder of *Alpinia galangal* L. Willd, *Cucurma longa* L. and *Coccinia cordifolia* Cong. Swingle are also applied to cure diabetes.

All the medicinal plants studied are used as anti diabetic since ancient times in India. All these medicines are used to cure more than one disease or ailments, hence their usage is helpful in curing diabetes as well as many other diseases. These medicinal plants are easily available and occur throughout the year. Preparation and usage of these medicines is so easy that everyone can use them very easily. Any of these medicinal methods to cure diabetes costs only one to two rupees per day. Therefore using these medicines can be a boon to cure diabetes in a cheap, easily available and reaction-less way. Although there is lack of scientific proving about the effectiveness of these medicines, many instances are evident when people using these herbal formulations for the cure of diabetes are benefited to a great extent. It was found that the traditional knowledge of herbs useful in curing diabetes used by the ancestors was acquired mainly by the local healers is in decline. This is because the new generation has very less interest in taking this as their profession. In India however, where more than 50% people live in less than a half dollar a day, and more than 80% population depends upon traditional medicines for their primary health conservation, the importance of utilization of these medicines becomes vital. Today, when India is said to become the capital of diabetes, methods based on medicinal plants can provide a new dimension in the field of regulation and treatment of diabetes.

TABLE – 1 : Cure of Diabetes by Indigenous Herbal Formulations

S. No.	Plant's botanical name/Family	Local/ English name	Useful part	Uses (Methods of Utilization)
1.	<i>Aegle marmelos</i> L. Corr. (Rutaceae)	Bael (Stone apple)	Leaves	Fresh leaves chewed twice daily. Powder of dry leaves mixed with equal amount of haldi (<i>Curcuma longa</i> L.) used twice daily after meals.
2.	<i>Allium cepa</i> L. (Alliaceae)	Piyaz (Onion)	Tubers	Juice of onion is taken everyday to cure diabetes.
3.	<i>Allium sativum</i> L. (Alliaceae)	Lahsun (Garlic)	Tubers	Cooked fresh tubers are taken in diabetes everyday.
4.	<i>Alpinia galangal</i> L. Willd. (Zingiberaceae)	Kulanjan (Greater galangal)	Root	Powder of dried roots is prescribed twice everyday in diabetes.
5.	<i>Andrographis paniculata</i> (Burm. F. Wall Ex. Nees. (Acanthaceae)	Kalmegh (Creat, Kariyat)	Leaves	Juice of fresh leaves is prescribed by traditional healers twice or thrice daily.
6.	<i>Annona squamosa</i> L. (Annonaceae)	Sharifa (Custard apple)	Leaves	Fresh leaves are chewed in diabetes. Powder of shadow dried leaves is consumed to cure diabetes.
7.	<i>Azadirachta indica</i> A. Juss. (Meliaceae)	Neem (Margosa Tree)	Leaves	Fresh juice of leaves is very useful in diabetes. Young leaves are chewed every morning to cure diabetes. Powdered dry leaves are mixed with Amla (<i>Embllica officinalis</i> Gaertn.), and taken twice daily.
8.	<i>Cajanus Cajon</i> (L.) Millsp. (Papilionaceae)	Arahar (Pigeon pea)	Leaves Seeds	Juice of fresh leaves is taken with salt everyday. Seeds can be used as vegetables.
9.	<i>Catharanthus roseus</i> (L.) G. Don. Syn. <i>Vincea rosea</i> (Apocynaceae)	Sadabahar, Barahmasi (Madagascar perwinkle)	Leaves	Juice of fresh leaves taken twice everyday. Powdered leaves are also taken orally.
10.	<i>Citrus aurantifolia</i> L. Syn. <i>Limonia aurantifolia</i> L. (Rutaceae)	Kaghzi nimbu (Lemon)	Fruit	Mixed equal amounts of lemon and bitter gourd taken in diabetes.
11.	<i>Citrus aurantium</i> L.	Narangi	Fruit	Decoction of powdered dry skin of

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	(Rutaceae)	(Orange)		fruit is taken orally thrice daily.
12.	<i>Coccinia cordifolia</i> Cogn. <i>Syn. Coccinia indica</i> (Cucurbitaceae)	Jangli Kundru (Kovai fruit)	Root	Root paste or powder is applied in early stages of diabetes.
13.	<i>Cucumis sativus</i> L. (Cucurbitaceae)	Kheera (Cucumber)	Fruit	Mixture of juice of cucumber and bitter gourd with rock salt used to cure diabetes.
14.	<i>Curcuma longa</i> L. <i>Curcuma domestica</i> L. (Zingiberaceae)	Haldi (Turmeric)	Rhizome	Dried powder of rhizome taken with equal amount of Alona fruit powder (<i>Embllica officinalis</i> Gaertn.)
15.	<i>Cynodon dactylon</i> (L.) Pers. (Poaceae)	Doobh ghaas (Bermuda grass)	Aerial parts	Fresh juice or paste of aerial parts used in diabetes.
16.	<i>Embllica officinalis</i> Gaertn. (Euphorbiaceae)	Alona (Embllic Tree)	Fruits	Powder of dried Embllica fruits is mixed with equal amount of turmeric powder (<i>Curcuma longa</i> L.) and taken to cure diabetes.
17.	<i>Eugenia jambolana</i> L. <i>Syn. Syzygium cumini</i> L. (Myrtaceae)	Jamun (Java plum)	Fresh fruits Leaves Seed powder	Fresh fruits eaten everyday. Chewing fresh leaves everyday after breakfast is very effective in diabetes. 5-10 g powder of dried seeds is taken twice or thrice everyday.
18.	<i>Ficus benghalensis</i> L. (Moraceae)	Bargad, Barh (Banyan Tree)	Leaves	Young, fresh leaves chewed every morning. Latex of leaves is useful in early stages of diabetes.
19.	<i>Ficus glomerata</i> (Moraceae)	Gular (Fig)	Fruits	Powder of dried fruits is useful in diabetes.
20.	<i>Gossypium arboreum</i> L. <i>Syn. Gossypium</i> <i>indium</i> (Malvaceae)	Kapas (Cotton)	Seeds	Dry seed powder or paste is taken orally in early stages of diabetes.
21.	<i>Gymnema Sylvestre</i> (Retz.) R. Br. Ex Schult (Asclepiadaceae)	Gudmar (Periploca of the woods)	Leaves	Fresh leaves are chewed before meals or powder of dried fresh leaves is taken before meals to cure diabetes.
22.	<i>Helianthus tuberosus</i> L. (Asteraceae)	Hathichuk (Jerusalem artichoke)	Tubers	Cooked tubers are also consumed in diabetes.
23.	<i>Lagenaria vulgaris</i> (Cucurbitaceae)	Lauki (Beetle guard)	Fruit	Juice mixed with rock salt is used as indigenous medicine.
24.	<i>Melia azedarach</i> L. (Meliaceae)	Bakayan Mahaneem (China berry, Pride of India)	Dry fruits	Powder of dried fruits (after removing outer cover) is taken twice everyday.
25.	<i>Momordica charantia</i> L. (Cucurbitaceae)	Karela (Bitter guard)	Fruit, Seeds	Juice of fresh fruits taken everyday. Seed powder is used in early stages of diabetes. Powder of shadow-dried fruits is taken orally twice a day.
26.	<i>Moringa oelifera</i> Lam. <i>Syn. Moringa</i> <i>pterygosperma</i> Gaertn. (Moringaceae)	Sahijan (Horse radish tree)	Leaves	A mixture of leaf juice and cucumber (juice) is prescribed by traditional healers to cure diabetes.
27.	<i>Murraya koenigii</i> L. (Rutaceae)	Meethi neem (Murraya)	Leaves	Fresh leaves are chewed, powder of dried leaves is consumed and effective to cure diabetes.
28.	<i>Ocimum sanctum</i> L. (Lamiaceae)	Tulsi (Holy Basil)	Leaves	Powder of shadow-dried leaves is consumed orally twice or thrice everyday.
29.	<i>Psidium guajava</i> L. Jamb. (Myrtaceae)	Amrood (Guava)	Leaves	Decoction of dry leaves is prescribed twice or thrice everyday in early stages of diabetes.
30.	<i>Solanum nigrum</i> L. (Solanaceae)	Makoi (Black nightshade)	Leaves and Aerial parts	Fresh aerial parts of plants are chewed. Cooked curry of aerial parts is also consumed orally.
31.	<i>Tamarindus indica</i> L. (Caesalpiniaceae)	Imli (Tamarind)	Seeds	Powdered seeds is prescribed twice everyday.

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32.	<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook. f. and Thoms (Menispermaceae)	Giloe (Tinospora)	Leaves, stem	Decoction of leaves and stem is used twice everyday in diabetes.
33.	<i>Trigonella foenum-graceum</i> L. (Papilionaceae)	Methi (Fenugreek)	Seeds Aerial parts	25g seeds are taken everyday after meals. One teaspoon seed powder is taken twice or thrice everyday. Cooked leaves are also useful in diabetes.
34.	<i>Vicia feba</i> <i>Syn. Faba vulgaris</i> (Papilionaceae)	Bakla (Broad bean)	Leaves	Juice of leaves and lemon with powdered black pepper is useful in diabetes.

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