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Diversity of Ethno –Medicinal Plants for Diabetes from Bahraich (U.P.) India

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Abstract

In this study the medicinal plants used in the treatment of diabetes mellitus is inventoried based on the ethno pharmacological survey in Bahraich district of Uttar Pradesh. Bahraich is well blessed with phytodiversity which is a rich source of medicinal plants as well as ethnic communities. The remote locality, poverty, illiteracy and lack of touch with modern civilization make them confined to hold on traditional faith hence they are wholly dependent on indigenous plants for the treatment of diabetes as well as other ailments. For the purpose traditional herbal healers as well as experienced elder persons were interviewed. The result indicated that the rural people use phytotherapy because it is cheaper, more efficient and without any side effect than modern medicine. In this ethno-medicinal enquiry sixty five species of medicinal plants belonging to sixty five genera representing thirty two families are cited which were used for the treatment of diabetes in the area. Many parameters have been evaluated such as knowledge of the method of medicine preparation, plant part used for medicinal purpose, doses and mode of administration. Many different plants have been used individually or in formulations with other plants. A list of medicinal plants with anti-diabetic properties which were mostly used in the treatment of diabetes are **Allium sativum**, **Aegle marmelos, Azadirachta indica, Curcuma longa**, **Emblica officinalis, Gymnema sylvestre, Mangifera indica**, **Momordica charantia, Syzygium cumunii, Trigonella foenum-geaecum**, **Terminelia bellerica, Terminelia chebula** and **Zingiber officinale** etc. In conclusion Bahraich district disposes a large phytotherapeutic knowledge which are to be scientifically investigated.

Key words - Medicinal plants, diabetes mellitus, ethnomedicine, phytodiversity, phytotherapy, Bahraich.

Introduction

The value of medicinal plants to the mankind is very well proven since vedic period. It is estimated that 70-80 % of people in developing countries depend on traditional medicines for their primary health needs. India and China are two of the largest countries in Asia which have the richest array of registered and relatively well known medicinal plants [1]. Different medicinal plants have been used to treat various ailments. In fact there is no any plant which is non medicinal. Plants produces a diverse range of bioactive molecules making them a rich source of different types of medicines. Ethno-botanical and ethno-medicinal studies are today recognized as the most viable method of identifying new medicinal plants or refocusing on those earlier reported plants for bioactive constituents. The rich biodiversity of Bahraich district of Uttar Pradesh has provided an initial advantage to its inhabitants for observing and scrutinizing the rich flora for developing their own traditional knowledge in curing various ailments. The primitive tribals acquired the knowledge of economic and medicinal properties of many plants by trial and error methods and they are the store house of such valuable knowledge.

This accumulated knowledge is passed on from one generation to the other by oral tradition without any written document [2.] The people of the region are rich in ethno-medicinal knowledge owing to their close affinity with the surrounding vegetation. A large number of plant species of immense medicinal value are abundantly found in the district. Medicinal plants form the basis of traditional or indigenous systems of healthcare are being used by the majority of remotely located dwellers of the area. Religious inspiration, inaccessibility and lack of medical facilities in the villages seem to be the cause of depending on these medicinal plant species. Remedies based on these plants often have negligible side effect and due to relatively high cost of allopathic medicines, traditional herbal medicine have become an affordable choice for the poor people in these rural areas. Traditional system of medicine is a wise practice of indigenous knowledge system, which has saved the lives of poor people in the region [3]. There is great traditional knowledge hidden among the tribes and rural people of the district which can be used for human welfare.

Keeping the aforesaid view, the rich ethno medicinal practices of the area have already received considerable scientific attention and the ethno medicinal practices have been documented. The present work is undertaken for the documentation and analysis of various traditional herbal method of treatment for diabetes in the rural areas of Bahraich district.

Diabetes Mellitus: Diabetes mellitus or diabetes is an endocrinological as well as genetical disorder and well known widespread biochemical deficiency disease of modern time. The disease is seen to be found in elder persons as well as youth, children and also new born babies. The disease is caused due to the imbalance of hormone insulin which is secreted by beta cells of the islets of langerhans in the pancreas. Insulin is the principal hormone that regulates uptake of glucose from the blood. It is a group of metabolic disease in which a person has high blood sugar either because the pancreas does not produce enough insulin or because cells do not respond to the insulin that produced high blood sugar which produces several classical symptoms of loss of weight, polyuria, polydipsia, polyphagia, increase perspiration, anxiety, irritation, tension and confusion etc. [4]. This result in high blood glucose and with time it creates cardiovascular, neurological and retinal complications. Diabetes is of two types, Type-1 and Type-2. Type-1 is insulin dependent diabetes in which patient takes insulin injection regularly for survival while Type-2 diabetes is non-insulin dependent diabetes (Madhumeh). Deficiency of insulin or the insensitivity of its receptors plays central role in all types of diabetes. Now many kinds of anti-diabetic medicines have been developed but most of them are chemical or biochemical agents. Despite the impressive advances in healthcare and medical sciences there are many patients who are using herbal medicines alone or complementary to the prescribed medication. Traditional herbal treatment is renowned for ancient times. There is no complete treatment of diabetes in any system of medicine but patient can lead normal life with some changes in their life style viz. balanced diet, physical work viz. exercise, yoga, daily morning walk, proper routine work etc. and use of herbal medicinal formulations with prescribed medication.

Study Area

Bahraich is known as ‘city of forest:’ because of its natural beauty and rich phytodiversity. It is situated between 28.24 and 27.4 latitude and 81.6 N to 81.3 E longitude, having area about 4696.8 Sq. km. in which 95,040 hectare land is covered by dense natural forests. Bahraich has international border with Nepal on the northern part. Shravasti is in eastern side where as Kheri Lakhimpur in wastern and Sitapur and Barabanki in southern side. Bahraich is 125 km north-east of Lucknow, which is the state capital of U.P. North - Eastern and Western part of the district is Tarai which is covered by dense natural forests.

Saryu and Ghaghra are the main rivers. The climate is hot & humid, maximum and minimum temperature ranges between 44◦c to 5◦c where as average rainfall is 1,125 mm. The soil of the district is very fertile [5]. "Katarniaghat Wildlife Sanctuary" is main point of attraction and specialty of the district Bahraich. Aforesaid ideal environmental factors support the luxurious growth of biodiversity.

Methodology

The present study is based on the field survey of Bahraich district of Uttar Pradesh. For the purpose the voucher specimens of ethno-medicinal importance were collected and documented with their ethno-therapeutic data. The information was collected from herbal practitioners or local healers and other experienced persons. They were interviewed for local names, plant part used, method of preparation of medicine, dosages and their mode of administration. The specimens were collected, pressed, dried, preserved, mounted as described by Jain and Rao, 1976 [6] identified through the available taxonomic literature manuals and floras [7, 8]. The specimens were maintained in Herbarium of the Botany Department. The plants used in the treatment of diabetes are enumerated in Table-1 with correct botanical name followed by vernacular names and family as well as plant parts used and mode of administration in respect to simple preparation as well as compound preparation of medicine. The references given in the text are provided with their wave links.

Medicinal plants used for the treatment of diabetes by rural people of Bahraich district are:

SIMPLE PREPERATION OF MEDICINE

Acacia nilotica (Linn**.)** Willd. (Syn. **A**. **arabica** Linn.) Babool, Kikar (Mimosceae):

•Five young leaves are made into paste and taken daily with a glass of water which is useful in diabetes.

Adhatoda vasica Nees., Arusa, Rusa, Vasaka (Acanthaceae):

•Chewing of two fresh leaves daily in the morning with empty stomach is useful to control the diabetes.

Aegle marmelos (Linn) Corr. Serr., Bel (Rutaceae):

•Regular consumption of four tender leaves with empty stomach controls diabetes increases immune system as well as purifies the blood.

• Fresh leaves are dried and powdered. One tea spoonful of powder is taken daily with luke warm water.

Allium cepa Linn**.,** Onion, Pyaz (Liliaceae):

• One bulb of onion is eaten daily which is useful in diabetes as well as for cardiovascular ailments.

• Twenty ml juice of bulb is taken daily which controls blood sugar as well as increases immune system of the body.

Allium sativum Linn., Garlic, Lahsun (Liliacae):

• Daily eating of 2-4 cloves of garlic bulb with luke warm water in morning with empty stomach is beneficial to control blood cholesterol, blood pressure as well as increases immune system.

• Ten ml juice of bulb is taken daily with water control diabetes as well as increases immunity of the body.

Aloe vera Linn., Ghritkumari, Ghaikwar (Liliaceae):

• Leaf gel is taken orally with empty stomach so as to control blood cholesterol and diabetes.

Amaranthus spinosus Linn., Chaulai (Amaranthaceae):

• Whole plant is cooked and eaten which is useful in diabetes.

Andrographis paniculata (Burm.f) Wall ex Nees (syn. **Justicia paniculata** Burm.f. **J**. **patibrosa** Russ., **J**.**stricta** Lam.ex stud) Kalpnath, kalmegh, Bhunimba (Acanthaceae):

• Four fresh leaves of kalpnath along with four black pepper (**Piper nigrum** Linn. Piperaceae) are made into paste. It is taken daily with empty stomach to control blood sugar as well as to increase the immune system.

• Ten ml juice of fresh leaves is taken with water twice daily for ten days controls blood cholesterol.

• Four leaves of kalpnath is chewed and engulfed with water daily in the morning with empty stomach controls diabetes as well as increases the immune system.

Annona squamosa Linn. Sharifa, Sitaphal (Annonaceae):

•Three fresh leaves are chewed daily with empty stomach to control diabetes.

Asparagus racemosus Willd., Shataver (Liliaceae):

•Twenty ml. juice of fresh root is taken for a week to control blood sugar.

•Three gm. powder of root is taken with a cup of milk controls diabetes.

Azadirachta indica A.Juss., Neem (Meliaceae):

• Two or three young leaves are chewed and engulfed with water daily in the morning with empty stomach for a month controls diabetes, blood pressure as well as increases immune system.

• Fresh leaves are dried in shade and powdered. One teaspoonful of powder is taken daily with water to control diabetes.

Barleria prionitis Linn., Katsariya, Piyabasa (Acanthaceae)

•Ten ml juice of fresh leaves is taken and a pinch of cumin powder is added to it and taken orally daily for few days which control excessive urination of diabetes.

Bauhinia variegata Linn., Kachnar (Caesalpinaceae):

• Flowers are eaten raw which is beneficial in diabetes.

Berberis aristata Linn., Daruhaldi (Berberidaceae):

•The root bark of the herb is powdered. One teaspoonful of powder is taken daily which stimulates pancreas to secret insulin.

Boerhavia diffusa (Linn.) Nom. Cons., Punarnava (Nyctaginaceae):

•Twenty ml. extract of fresh leaves is taken daily with water for few days controls diabetes. It is also a potent hepato-proctectiv as well as immunomodulator.

Brassica compestris Linn., Mustard, Sarso, (Brassicaceae):

• Leaves of plant are cooked and eaten is useful in diabetes.

Brassica oleracea Linn. Kohlrabi, Knoll-khol, Ganthgobhi (Brassicaceae):

•Taking one cup juice of knoll- khol with water daily in the morning with empty stomach is beneficial in diabetes.

Bryophyllum pinnatum (Lam.) Oken., Ajuba, Parnbeej (Crassulaceae):

• Five ml juice of fresh leaves is taken daily controls diabetes.

Catharanthus roseus G. Don., Sadabahar (Apocynaceae):

•Two or three leaves or flowers are chewed every day in the morning with empty stomach controls diabetes.

Cassia fistula Linn., Amaltas (Caesalpiniaceae):

• Fresh leaves are dried and made into powder. One teaspoonful of powder is taken daily with water controls diabetes.

• Three flowers chewed daily in the morning with empty stomach beneficial in diabetes.

Cassia tora Linn., Chakwad (Caesalpiniaceae):

• Decoction of ten gm root is taken daily for few days which is useful in diabetes.

Carum copticum Linn. (Syn. **Trychospermum ammi** (Linn.) Sprague., Ajwain, Carom Caraway (Apiaceae):

• One teaspoonful of seed is powdered and taken daily with a cup of luke warm water before meal reduces blood cholesterol and also controls diabetes.

Chenopodium album Linn. Goosefoot, Bathua (Chenopodiaceae):

• Leaves are cooked and eaten daily is useful in diabetes.

• Plant is boiled and sufficient amount of common salt is added to it. It is taken orally for few days control diabetes.

Citrus aurantifolia (Christm.) Swingle., Lemon, Neembu (Rutaceae):

• One lemon juice is taken with a glass of water twice daily controls blood sugar.

Coccinia grandis (Linn.) Voigt., Kundru (Cucurbitaceae):

• Fresh Leaves are chewed to controls diabetes.

• Fruit is cooked and eaten daily is useful in diabetes.

Convolvulus microphyllus Sieb. ex. Spreng., Sankhpuspi (Convolvulaceae):

• Leaves and flowers are powdered. Five gm powder is taken daily with water or cow milk.

Coriandrum sativum Linn., Coriander, Dhania (Apiaceae):

• Eating of whole plant in any form is useful in diabetes.

• Four fresh green leaves are chewed daily controls diabetes.

Curcuma longa Linn., Turmeric, Haldi, Haridra, (Zingiberaceae):

• Drinking a glass of luke warm fat free milk mixed with half teaspoonful of turmeric twice a day controls blood cholesterol.

• A glass of luke warm water mixed with half teaspoonful of rhizome powder is taken daily controls diabetes.

Cynodon dactylon (Linn.) Pers., Doobghas (Poaceae):

• Five fresh leaves are made into paste. It is taken with water daily for fifteen days controls diabetes. It is also a potent natural blood purifier as well as anti inflammatory.

Dolichos lablab Linn., Bean, Sem (Fabaceae):

• Cooked beans are eaten as vegetable is useful in diabetes.

Emblica officinalis Gaertn., Awla (Euphorbiaceae):

•Fruit is eaten daily in any form is useful in diabetes.

•Ten ml juice of fresh fruit is taken twice daily controls diabetes.

•Five gm. powder of fruit and seed is taken daily with luke warm water controls blood sugar.

Ficus benghalensis Linn**.,** Bargad, Ficus (Moraceae):

•Stem bark is powdered and a teaspoonful of powder is taken daily with a cup of fat free milk controls diabetes.

Ficus racemosa Linn. **syn. F. glomorata** Linn., Gular (Moraceae):

• Raw fruit is eaten to controls diabetes.

• Roasted raw fruit is mashed & sufficient amount of common salt is mixed to it and eaten daily for few day controls diabetes.

Ficus religiosa Linn., Peepal (Moraceae):

• Three young leaves are chewed daily is useful in diabetes.

Glycine max Linn., Soyabean (Fabaceae):

• One cup milk of seeds is taken daily for few days controls blood sugar.

• Twenty gm soaked seeds are eaten daily for twenty days is beneficial in diabetes.

Gymnema sylvestre R. Br., Gurmar, Madhuvinashini, Sugar killer (Ascalepidaceae):

•Fresh leaves are chewed daily to control diabetes.

•Extract of fresh leaves is taken daily for few day to control diabetes.

Hibiscus rosa-sinensis Linn., Gurhal (Malvaceae):

• Five flower bud is taken daily in the morning with empty stomach for a month controls diabetes.

Lagnaria sicerraria (Molina) Standl., Lauki. Bottle guard, (Cucurbitaceae):

• One cup of fruit juice is taken daily with empty stomach which maintain blood cholesterol controls diabetes as well as cures peptic ulcer and constipation.

Lycopersicon lycopersicum Linn**.** (syn**. Lycopersicum esculantum** Linn.) Tomato, Tamatar (Solanaceae):

• Red fruit is taken daily as salad which is beneficial in diabetes.

• Two hundred gm fresh red ripe fruit is boiled in a glass of water and mashed. A pinch of salt and blabk pepper powder and cumin powder is mixed in it. This soup is taken twice daily which controls cholesterol.

Mangifera indica Linn**.,** Mango, Aam (Anacardiaceae):

• Three fresh young leaves are crushed and its extract is taken with empty stomach controls diabetes.

• One teaspoonful of leaf powder is taken daily in the morning with empty stomach for twenty days controls diabetes.

•Five fresh leaves are washed and boiled in a glass of water in the night and is left overnight with leaves soaking in their own extracts. In the morning sieve the water. The filtrate is taken with empty stomach controls diabetes.

Madhuca indica Linn., Mahua (Sapotaceae):

• Bark is powdered and one teaspoonful of powder is taken daily with luke warm water is useful in diabetes.

Mentha arvensis Linn**.,** Mint, Pudina (Lamiaceae):

• Leaves being taken daily in any form is useful in diabetes.

Momordica charantia Discourt., Bitter guard, Karela (Cucurbitaceae):

•Fruit is boiled and sufficient amount of common salt is added to it. It is eaten daily to controls blood sugar.

• One cup of fruit juice is taken daily with empty stomach to control the diabetes.

• Fruit dried in shade is powdered. Five gm powder is taken daily with honey or water to controls diabetes.

Moringa oleifera Linn., Sahjan (Moringaceae):

• Bark is powdered and one teaspoonful of powder is taken daily with luke warm water is useful in diabetes.

• Two leaves are chewed daily in the morning with empty stomach to control diabetes.

• Five fruits of **Moringa** are cut into pieces and boiled in four hundred ml. of water with two ripe red tomatoes (**Lycopersicum esculantum** Linn., Solanaceae). It is mashed and filtered. A pinch of common salt, black pepper and cumin powder is added to it and taken orally. It controls diabetes if taken daily for a month.

Murraya koenigii Linn., Sprengel, Curry plant, Meethi neem (Rutaceae):

• Eating 5 leaves of curry plant every day in morning with empty stomach lowers cholesterol and controls diabetes.

• Ten ml juice of fresh leaves is taken daily in the morning with empty stomach which controls cholesterol.

Ocimum sanctum Linn., Tulsi, Holy basil (Lamiaceae):

• Regular consumption of ten fresh leaves of tulsi controls diabetes as well as blood pressure. It is also a potent immunomodulator.

Oxalis debilis HBK var. **Corymbosa** (DC) Lour. **O**. **martiana** Zucc., Khattibooti (Oxalidaceae):

• Fresh leaves are chewed which is full of vitamin c and it is also useful in diabetes.

Phyllanthus fraternus Webster., Bhuiawala (Euphorbiaceae):

• Extract of fresh leaves is taken daily for few days controls diabetes.

Psidium guajava Linn**.,** Guava, Amarud (Myrtaceae):

• Three young leaves are chewed daily which reduces blood cholesterol.

Pterocarpus marsupium Roxburgh., Vijayasaar (Fabaceae):

• The bark of the tree is made into a wooden glass (tumbler cup). Wooden glass full of water is kept overnight. The color of water changes brown. It is consumed daily early in the morning which controls diabetes. The glass should be changed after a month.

Pyrus malus Linn., Apple, Seb (Rosaceae):

• Daily eating of one apple fruit in the morning with empty stomach controls blood cholesterol as well as blood sugar.

Raphnus sativus Linn., Radish, Muli (Brassicaceae):

• Daily consumption of radish controls blood cholesterol.

• Daily eating of cooked vegetable of whole plant is helpful in the treatment of diabetes.

• One cup radish juice is taken daily which controls blood sugar.

Salacia reticulata Wight., Saptrangi (Celastraceae):

• Extract of fresh leaves is taken after taking high carbohydrate meal controls blood sugar.

Seasmum indicum Linn., Sesame, Till (Pedaliaceae):

• Twenty gm. seeds are eaten daily for a month in winter season is beneficial to diabetic patient.

Solanum melongena Linn., Brinjal, Baigan, (Solanaceae):

• Eating of cooked or roasted fruit is beneficial for diabetic patient.

Syzygium cumini (Linn.) Skeels. (syn. **S**. **jambulanum** DC., **Eugenia jambulana** Lam.) Jamun, Jambul (Myrtaceae):

• Five gm. powder of dried fruit is taken with water twice daily controls diabetes.

• Ten ml. juice of fresh leaves is taken daily with empty stomach controls diabetes.

• Two leaves chewed daily which cures as well as controls diabetes and blood pressure.

Tagets erecta Linn., Marigold, Genda (Asteraceae):

• Fresh leaves are made into paste and its extract is taken orally with sufficient amount of honey. It is beneficial in diabetes.

Terminalia chebula Retz., Harre, Harida (Comberetaceae):

• One teaspoonful of fruit and seed powder is taken orally with luke warm water once daily before going to bed controls diabetes.

Tinospora cardifolia (Thunb.) Miers., Giloye, Guduchi (Menispermaceae):

• Extract of fresh leaves taken for few days control high blood sugar.

Trigonella foenum – **graecum** Linn., Methi, (Fabaceae):

• One teaspoonful of seeds powder is taken daily in the morning with empty stomach controls diabetes.

• Twenty five gm seeds are soaked in a glass of water in the night. It is filtered in the morning and filtrate is taken orally for twenty days controls diabetes.

Ziziphus mauritiana Lam**.,** Indian plum**,** Ber **(**Rhamnaceae):

• Dried fruit is grinded and powdered. One teaspoonful of powder is taken daily which is useful in diabetes.

COMPOUND PREPARATION OF THE MEDICINE

•**Aegle marmelos** Linn., Bel (Rutaceae)	ten leaves
Azadirachta indica Linn., Neem (Meliaceae)	five leaves
Mangifera indica Linn., Mango (Anacardiaceae)	five leaves
Syzygium cumunii Linn., Jamun (Myrtaceae)	five leaves
Ocimum sanctum Linn., Tulsi (Lamiaceae)	ten leaves

Fresh young leaves of all above are taken and made into paste with the help of water. Its extract is taken daily for ten days with empty stomach controls high blood sugar.

• **Aegle marmelos** Linn., Bel (Rutaceae)	ten leaves
Annona squamosa Linn. Sharifa (Annonaceae)	three leaves
Azadirachta indica Linn., Neem (Meliaceae)	five leaves
Ocimum sanctum Linn., Tulsi (Lamiaceae)	ten leaves

Fresh leaves of above all the plants are taken and made into paste with the help of water. Its extract is taken daily with empty stomach for ten days regularly controls high blood sugar.

• **Aloe vera** Linn., Ghritkumari (Liliaceae)	1 spoonful
Curcuma longa Linn., Turmeric (Zingiberaceae)	½ teaspoonful

Aloe vera gel is mixed with turmeric rhizome powder and taken daily with help of water controls diabetes.

• One spoonful of ghritkumari (**Aloe vera** Linn. Liliaceae) gel is mixed with a teaspoonful of ginger (**Zingiber officinale** Roscoe, Zingiberaceae) juice. It is taken daily with empty stomach controls diabetes.

•**Ananas comosus** Merr., Pineapple, Ananas (Bromeliaceae)	100 ml. fruite juice
Seasmum indicum Linn., Til (Pedaliaceae)	10 gm. seed
Emblica officinalis Linn., Awala (Euphorbiacea)	10 gm. seed
Terminalia bellerica Linn**.,** Bahera (Combretaceae)	10 gm. seed
Terminalia chebula Linn., Hareda (Combretaceae)	10 gm seed
Syzygium cumunii Linn., Jamun (Myrtaceae)	10 gm seed

Seeds of above all the ingredients are mixed in fruit juice of ananas and dried. After dried it is powdered. three gm powder is taken daily in the morning which controls excess urination of diabetes.

• **Cardamine scutata** Linn., Chamsur **(**Brassicaceae)

Carum copticum Linn., Ajwain (Apiaceae)

Nigella sativa Linn., Kalauji, Mangarail (Ranunculaceae)

Trigonella foenum-graecum Linn. Methi (Fabaceae)

Seeds of above all ingredients are taken in equal amount and powdered. One teaspoonful of powder is taken daily in the morning with empty stomach with the help of luke warm water. It is taken daily for about twenty days to control high blood sugar.

• **Emblica officinalis** Linn., Awala (Euphorbiaceae)		100 gm.
Terminalia bellerica Linn., Bahera (Combretaceae)		100 gm.
Terminalia chebula Linn., Hareda (Combretaceae)		100 gm.

Dried fruit of above all plants are taken in equal amount and is powdered. It is known as trifala churn. One teaspoonful of powder is taken in the night with luke warm water which controls diabetes as well as very effective in constipation.

• **Curcuma longa** Linn., Turmeric, Haldi (Zingiberaceae)	rhizome	100 gm.
Trigonella foenum-graceum Linn., Methi (Fabaceae)	seed	50 gm.
Piper nigrum Linn., White pepper (Piperaceae)	seed	50 gm.

All the ingredients are dried and powdered. One teaspoonful of powder is taken daily with a glass of cow milk to control diabetes.

• **Emblica officinalis** Linn., Awala (Euphorbiaceae)	fruit	10 gm
Terminalia bellerica Linn., Bahera (Combretaceae)	fruit	10 gm
Terminalia chebula Linn., Hareda (Combretaceae)	fruit	10 gm
Trigonella foenum-graecum Linn., Methi (Fabaceae)	seed	10 gm
Carum copticum Linn., Ajwain (Apiaceae)	seed	10 gm

All the ingredients are powdered and its decoction is prepared. Decoction is taken daily for a week to control diabetes.

• **Emblica officinalis** Linn., Awala (Euphorbiaceae)	fruit	100 gm
Curcuma longa Linn., Turmeric, Haldi (Zingiberaceae)	rhizome	50 gm
Zingiber officinale Linn., Ginger, Sonth (Zingiberaceae)	rhizome	50 gm

All the ingredients are powdered. One teaspoonful of powder is taken twice daily with a teaspoonful of honey to control diabetes.

• **Euphorbia hirta** Linn., Dudhi (Euphorbiaceae)	whole plant	200 gm
Gymnema sylvestre R.Br., Gurmar (Asclepiadaceae)	leaves	100 gm
Syzygium cumunii Linn., Jamun (Myrtaceae)	seed	100 gm
Zingiber officinale Roscoe, Sonth (Zingiberaceae)	rhizome	100 gm

All the ingredients are powdered and made into pea size tablets. Two tablets are taken twice daily to control diabetes.

• **Gymnema sylvestre** R.Br., Gurmar (Asclepiadaceae)	leaves	200 gm
Syzygium cumunii Linn., Jamun (Myrtaceae)	seeds	100 gm
Zingiber officinale Roscoe., Sonth (Zingiberaceae)	rhizome	50 gm
Salacia oblonga Saptrangi (Celastraceae)	leaves	50 gm

All the above ingredients are dried and powdered. The powder is mixed with sufficient amount of ghritkumari (**Aloe vera** Linn. Liliaceae) gel and its tablets are formed. One-one tablet is taken twice daily with honey which controls diabetes.

• **Gymnema sylvestre** R.Br., Gurmar (Asclepiadaceae)	leaves	30 gm

Azadirachta indica Linn., Neem (Meliaceae)	leaves	30 gm
Catharanthus roseus Linn., Sadabahar (Apocynaceae)	leaves	30 gm
Aegle marmelos Linn., Bel (Rutaceae)	leaves	30 gm
Syzygium cumunii Linn., Jamun (Myrtaceae)	seeds	50 gm
Piper nigrum Linn., Kalimirch (Piperaceae)	seeds	30 gm
Momordica charantia Linn., Karela (Cucurbitaceae)	seeds	20 gm
Ficus racemosa Linn., Gular (Moraceae)	leaves	30 gm

All the ingredients are dried in shade and to be powdered. Three gm powder is taken twice daily with the help of water which is very effective in the treatment of diabetes.

• Seven leaves of tulsi (**Ocimum sanctum** Linn. Lamiaceae) and five black pepper (**Piper nigrum** Linn. Piperaceae) are made into paste and taken with water daily for ten days which is useful in diabetes

• **Zingiber officinale** Roscoe., Ginger, Dry Ginger, Sonth, Adrak (Zingiberaceae):

Three gm powder of dry ginger and awla (**Emblica officinalis** Gartn. Euphorbiaceae) are taken daily which controls diabetes**.**

Results

The perusal of the result shows that there are sixty five plant species belonging to sixty one genera representing thirty two families used for the treatment of diabetes. The most important and effective medicinal plant species are being used in the treatment are **Allium sativum**, **Aegle marmelos, Azadirachta indica, Curcuma longa**, **Emblica officinalis, Gymnema sylvestre, Mangifera indica**, **Momordica charantia, Syzygium cumunii, Trigonella foenum-geaecum**, **Terminelia bellerica, Terminelia chebula** and **Zingiber officinale**. The herbal treatment is very effective and without any side effect. The plants were used either separately or in combination with some of other plants for better result. The mode of medicine administration is also varies. Somewhere medicine is taken with water, where as sometimes with honey or milk. Most of these plants are commonly available in natural resources in the district hence the rural people used ethno-medicinal formulations for the treatment of diabetes.

Discussion

The enormous potential hidden in these plants is God gifted being provided by nature. The perusal of the table shows that many of the plant species which are being used by the rural people for treatment of diabetes are very common, easily available either at low or no cost and their mode of preparation as well as administration is also simple and convenient, treatment are without any side effect hence affordable and useable. The result shows that there is wide scope for further scientific study. Ethno-medicinal data may provide a base to start the search the new compounds related to phytochemistry and pharmacology. Attention should also be made on proper exploitation, utilization and conservation of these medicinal plants.

Conclusion

The study indicated that, the study area is rich in plants having ethno-medicinal properties that may treat diabetes as well as various other ailments. Through modern medical system is well designed to treat the disease but the local people dependent on traditional medicine because of their deep rooted tradition and belief in their traditional culture and ayurveda. The knowledge of traditional healthcare is limited to traditional healers, who are living in rural areas. Hence there is a need to preserve the traditional knowledge and its proper documentation before it is lost forever. The study also highlights the need for further investigation on biochemical and pharmaceutical aspects of this traditional system of medicine because one of the major problem with this herbal formulation is that the active ingredients are not well defined. Therefore it is important to know the active component and their molecular interaction which will help to analyze therapeutic efficacy of the medicine.

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