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Madhujeevan Churna- Sanjeevani for Diabetic Patients



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ABSTRACT

Diabetes mellitus is one of the most widely occurring diseases in the Indian population. Increased level of Sugar may act as Sweet Poison which directly and indirectly may serve as obstacle in regular function of tissues and organs. It may be one of the root cause of new diseases. If the population increases and one day will come each and every one will be diabetic and it may have impact on individual, family and development of country. It is need of time to prevent, control and cure such diseases by allopathic or herbal medicines. All those few medicines available in market have side effects, adverse effect till now no one is best remedy for uprooting of diabetes. This review article represents geographical, phytochemical and pharmacological information of such medicinal plants which are the best alternative to synthetic one. If following medicinal plants extract is used to prevent or to treat diabetes then there will be decline in phase of the diabetic population.



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1. Introduction:

Diabetes mellitus is the most common endocrinal metabolic condition, characterized by insulin insufficiency in the body. It is the most common disorder, affecting over 100 million people globally. It is a rapidly spreading endocrine illness that is affecting both emerging and developed countries ^[1].

Insulin, as an anabolic hormone, causes metabolic irregularities in Carbs, lipids, and proteins. Diabetes has been shown to harm numerous biological systems, including blood vessels, eyes, kidneys, heart, and nerves. Diabetes mellitus is classified into two major types: type I and type II, Includes one minor type known as gestational diabetes and maturity-onset diabetic mellitus (MODY) ^[2].

It is estimated that in India's adult population, 72.96 million cases are diabetes. The prevalence in urban areas varies between 10.9 and 14.2 percent, while rural India was between 3.0 and 7.8 percent among the population of 20 years of age and above (INDIAB Study). And this number was predicted to increase to 109 million by 2035. The Indian Council of Medical Research (ICMR) conducted a study that revealed that Maharashtra has the highest proportion of people affected, followed by Tamil Nadu. More than half of all diabetics are unaware of their condition, which can lead to serious health issues if not diagnosed and treated early. Diabetes increases the risk of heart attack and stroke by two to three times in adults ^[3].

Most of the population in India has suffered by diabetes mellitus which is characterised by increased blood sugar level. It may acts as sweet poison and obviously its impact on every organ in biological system of human. It may cause a precursor for different disorders and diseases. Increased sugar level can cause lipid peroxidation of cells and the generation of free radicals in our body. Many of synthetic drugs are available in market to treat hyperglycemia there drugs are effective but having known side effects which may cause creation of another disorder and hence our body will be networking of variety of disorders. Thus there will be aging and over healthy condition of human that may tend to individual health mental stress, physical unfitness, and unaffordable economic stress. It may result in an imbalance in individual, family and overall bad impact on economic growth of country. One of the best alternatives to allopathic medicine is the herbal medicine and one of the best polyherbal formulations which is clinically proved as the best antidiabetic remedy for type II

diabetic patients is madhujeevan churna which consists of following medicinal plants which have also been reported as official herbal antidiabetic sources.

2. Madhujeevan churna

2.1 Neem:

- Kingdom – Plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- Sapindales
- Genus- *Azadirachta*
- Species- *indicator*
- Synonym - margosa, Indian lilac
- Biological source - Fresh or dried leaves and seed oil of the plant *Azadirachta indica*.
- Family – Meliaceae

2.1.1 Geographical source - *Azadirachta* is indigenous to India. Additionally, it is grown in Sri Lanka, Pakistan, and Bangladesh. The neem tree grows quickly and rarely reaches heights of 35 to 40 metres. It is evergreen ^[4].

2.1.2 Morphology - A neem is a tree with medium size, wide rounded crown that can measure up to 10–20 m in diameter. It can grow to a height of 15–30 m. Although primarily evergreen, it occasionally loses leaves in the dry season. The flowers are abundant, fragrant, white, and are produced in huge clusters that can reach 30 cm in length. Neem fruits are smooth, drupes are 1-2 cm long with white milky liquid when immature, and change yellow to brown when they mature ^[5].

2.1.3 Phytochemistry - *Azadirachtin* is the most significant active component, followed by sodium nimbin, nimbolin, nimbin, quercetin, nimbidin, nimbidol, gedunin and salannin. N-hexacosanol, amino acids, ascorbic acid, 6-desacetylnimbinene, nimbandiol, nimbolide,

7-desacetyl-7-benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, nimbiol, 17-hydroxyazadiradione are among the substances found in leaves. Neem fresh leaves were used to purify the polyphenolic flavonoids quercetin and β -sitosterol, which are known to have antifungal and antibacterial activities. Neem seeds also contain beneficial compounds like gedunin and azadirachtin [6].

2.1.4 Uses - Neem has anti-inflammatory, antioxidant, antiviral, and anti-diabetic effects. Numerous effects have also been investigated, including those that are antibacterial, antifungal, anthelmintic, antiparasitic, anticancer, antiHIV, anti bone resorption, antispasmodic, antipyretic, antidiarrheal, immunomodulatory, hypolipidemic, anti-microbial, hepatoprotective, and gastroprotective [7].

2.1.5 Mechanism of action- vitro assays concluded that neem possesses hypoglycaemic activity and can be used in the management of diabetes. The active principles of neem are responsible for inhibitory action of α -amylase, α -glucosidase and increased glucose uptake in Yeast cells. Dose-dependent α -glucosidase and α -amylase inhibitory activity was also observed in the Neem and compared with acarbose, which is a major tool for further investigations. The inhibitory action became more significant with increasing concentration of the neem. There is the possibility to suggest that the bioactive compounds present in the neem oil may be responsible for their α -glucosidase inhibitory activity. The rich phytochemical constituent and high α -glucosidase inhibitory activity of neem under study supports local claims on the efficacy of these plants and provides possible lead for the isolation of active compounds [8].

2.1.6 Marketed Dosage form –

- i) Madhumehari Granules by Baidyanath
- ii) Diabeta by Ayurvedic cure ayurvedic herbal health products

2.2 Bitter melon:

- Kingdom – Plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta

- Class- Mangoliopsida
- Order- cucurbit ales
- Genus- *Momordica*
- Species- *charantia*
- Synonym - balsam pear, bitter gourd, (India) karela, and (Philippines) ampalaya.
- Biological source – *fresh green fruits of the plant known as Momordica charantia.*
- Family – cucurbitaceae

2.2.1 Geographical source - a very bitter fruit that can be found in Africa, the Caribbean, South Asia, and Asia. The Hawaiian Islands are another place you can find it.

2.2.2 Morphology – annual climbing herb. Stem are 1-2 cm long and puberulous, simple. Reniform or suborbicular leaves that are 4–12 cm long and as wide, both surfaces glabrous, noticeably nerved, 5-7 lobed, with lobes that are ovate–oblong and bases that are pubescent [9].

2.2.3 Phytochemistry- bitter melon consists the following chemical constituents including alkaloids, charantin, charine, cryptoxanthin, lauric acid cucurbitacins, cucurbitanes, diosgenin, cycloartenols, , elaeostearic acids, erythrodiol, galacturonic acids, gentisic acid, goyaglycosides, linoleic acid goyasaponins, guanylate cyclase inhibitors, gypsogenin, momordin, hydroxytryptamines, karounidiols, lanosterol, linolenic acid, momorcharasides, cucurbitins momorcharins, momordenol, momordicilin, momordicin, momordicinin, momordicosides, oxalic acid momordolo, multiflorenol, myristic acid, nerolidol, oleanolic acid, oleic acid, rosmarinic acid pentadecans, peptides, petroselinic acid, polypeptides, proteins, ribosome-inactivating proteins, trehalose, rubixanthin, spinasterol, steroidal glycosides, stigmasta-diols, stigmasterol, taraxerol, vacine trypsin inhibitors, uracil, serine, v-insulin, verbascoside, vicine, zeatin, zeatin riboside, zeaxanthin, zeinoxanthin amino acids-aspartic acid, lutein, glutamic acid, thscinne, alanine, g-amino butyric acid and pipercolic acid, ascorbigen, elasterol, lycopene, pipercolic acid, flavochrome, b-sitosterol-d-glycoside and citrulline. Soluble pectin but free pectic acid is not found in the fruit pulp [10].

2.2.4 Uses - anti-diabetic, anti-obesity, anti-inflammatory anti-cancer, anti-microbial, immunomodulatory hypotensive, antioxidant, anti-hyperlipidemic ^[11].

2.2.5 Mechanism of action- Momordica charantia Improve glucose oxidation through the shunt pathway by activating glucose -6-phosphate dehydrogenase, enhance glucose utilization by liver, and reduce gluconeogenesis by inhibition of two important enzymes, fructose -1,6 bisphosphatase and glucose -6-phosphat. Charantin is an alkaloid and peptide that resembles insulin. Beta-sitosterol-beta-D-glucoside and stigmadien-3-beta-ol glycoside are both present in charantin. The bitter melon fruit, which contains more of these compounds, has a more dramatic hypoglycemia impact. Also contains phyto-nutrient, polypeptide-P; a plant insulin is known to lower blood sugar levels ^[12].

2.2.6 Marketed Dosage form-

i) Bitter gourd powder by Garry and sun natural remedies

ii) HypoNIDD by charak Pharma

2.3 Jamun

- Kingdom – Plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- Myrtales
- Genus- *Syzygium*
- Species- *cumini*
- Synonym – black plum, damson plum, Indian blackberry
- Biological source - – fruits and *seeds of the plant known as Syzygium cumini.*
- Family – Myrtaceae

2.3.1 Geographical source – Being indigenous to India, Ceylon, Burma, and the Andaman Islands, it can be found In several Indian states, including Uttar Pradesh, Punjab, Haryana, Gujarat, Maharashtra, Madhya Pradesh, Chhattisgarh, Bihar, Karnataka, Jharkhand, Andhra Pradesh, and Tamil Nadu, it is cultivated as a wild and semi-wild tree.

2.3.2 Morphology - *Syzygium cumini* is a huge, densely foliated, evergreen tree that bears medium to large polyembryonic fruit species. It also has thick, light greyish-brown bark. Evergreen, elliptic or long-oval, and between 5 and 18 cm long, the leaves are opposite. The clusters of sessile, whitish-yellow flowers with a funnel-shaped calyx and four to five joined petals appear ^[13].

2.3.3 Phytochemistry – Fruit contains Anthocyanins, glucosides of delphinidin, petunidin, malvidin, peonidin, cyaniding and Volatile oils. Seeds leaves and steam consists of Ellagitannins, Jambosine, gallic acid, ellagic acid, corilagin, 3, catholic (maslinic) acid, 6-hexahydroxy diphenylglucose, 1-galloylglucose, 3 galloylglucose, quercetin, β -sitosterol, n-hepatcosane and 4,6 hexahydroxy diphenyl glucose, β -sitosterol, betulinic acid, mycaminose, quercetin, nnonacosane, n-hentriacontane, octacosanol, myricetin, n-triacontanol, n-dotricontanol and the flavonol glycosides myricetin3-O-(4''-acetyl)- α Lrhamnopyranosides. Essential oils, Friedelin, friedelan-3- α -ol, gallic acid betulinic acid, β -sitosterol, kaempferol, β -sitosterol-Dglucoside, myricetine, ellagic acid, gall tannin and ellagitannin ^[14].

2.3.4 Uses – fruit is reported to have various pharmacological activities like antidiabetic, antihyperlipidaemic, antimicrobial, antioxidant, antiulcer, hepatoprotective, antiallergic, antifertility, antiarthritic, anti-inflammatory, radioprotective, antipyretic, antiplaque, antidiarrhoeal, neuropsychopharmacological and nephroprotective activities ^[15].

2.3.5 Mechanism of action - The potential method by which seed decreases blood sugar levels may be by potentiation of the insulin action of plasma by either increasing pancreatic insulin secretion from B-cells of the islets of Langerhans or its release from the bound state. Other plants have also been reported to have hypoglycemic effects through stimulating insulin release ^[16].

2.3.6 Marketed Dosage form –

i) Pancreatic tonic 180 cp by Ayurvedic herbal supplement

ii) Ayurveda alternative herbal formulation to diabetes by Chakrapani Ayurveda

2.4 Gudmar

- Kingdom – plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- Gentianales
- Genus- *Gymnema*
- Species- *sylvestre*
- Synonym – madhunashini, kavali
- Biological source - The fresh or dried leaves of plant *Gymnema sylvestre*.
- Family- asclepiadaceae

2.4.1 Geographical source - native to Africa, Asia and Australia. Also, it is available throughout India especially in states like goa and utter Pradesh.

2.4.2 Morphology - *Gymnema* is a common woody climber with many branches that climbs over the tops of big trees. Branch tips and young stems have pubescence.

The bases of the leaves are spherical or heart-shaped, and the petioles are 6–13 mm long and pubescent. The leaves are ovate-elliptic, shortly acuminate or acute, and up to 3 cm wide ^[17].

2.4.3 Phytochemistry - Triterpene saponins from the oleanane and dammarene classes are found in the leaves of *G. sylvestre*. *Gymnema* saponins and gymnemic acids are oleananesaponins; gymnemasides are dammarene saponins. Flavones, anthraquinones, resins, pentatriacontane, a and b-chlorophylls, Phytin, formic acid, d-quercitol, tartaric acid, butric acid, lupeol, β -amyrin related glycosides, and stigma sterol are other plant components in addition to these. Alkaloids are also detected in the plant extract. Acidic glycoside, anthraquinones, and their derivatives are produced by the leaves of *G. sylvestre*.

Gymnemic acid, gurmarine, tartaric acid, choline, calcium oxalate, betain glucose stigma sorbit, and are among the main chemical components of gymnema. Gymnemic acid, the plant's primary ingredient [18].

2.4.4 Uses - In addition to being used for arthritis, diuretic, anemia, osteoporosis, hypercholesterolemia, constipation, cardiopathy, asthma, anti-inflammatory conditions, microbial infections and indigestion the plant has a wide spectrum of therapeutic properties [19].

2.4.5 Mechanism of action - The mechanism of action of Gymnemic acids is through stimulation in insulin secretion from pancreas. It also has a comparable impact by delaying the blood's absorption of glucose. Gymnemic acids atomic configurations resemble those of sugar molecules, which fill taste buds receptors and prevent them from being activated by sugar molecules in food. Gymnemic acids have a cascade of actions that contribute to their hypoglycemic effect, beginning with the modification of incretin activity, which causes and release and insulin secretion. Additionally, it promotes pancreatic islet cell regeneration for improved enzyme-mediated glucose uptake. This mechanism interferes with the ability of receptors in the intestine and mouth to sense sweetness and reduces fatty acid and glucose absorption in the small intestine [20].

2.4.6 Marketed Dosage form –

- i) Diabetes daily care by natures healthy supply
- ii) Gurmar powder by Garry and sun natural remedies

2.5 Turmeric

- Kingdom – Plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Liliopsida
- Order- zingiberales
- Genus- *Curcuma*

- Species- *longa*
- Synonym – haldi, curcumin
- Biological source - dried rhizome of *Curcuma longa* Linn.
- Family- Zingiberaceae

2.5.1 Geographical source - The plant is indigenous to southern Asia, and it is widely farmed there. In India, China, the East Indies, Pakistan, and Malaya, it is cultivated on a bigger scale.

2.5.2 Morphology - The primary rhizomes are frequently short-branching and ovate or pear-shaped, oblong, pyriform, or cylindrical. The secondary, more cylinder-shaped, laterally branching, tapering on both ends rhizomes also known as "fingers" are 4–7 cm long and 1-1.5 cm wide. Deeply yellow to brown and longitudinally wrinkled on the outside ^[21].

2.5.3 Phytochemistry – Curcuminoids and essential oil, the yellow coloring agents of turmeric, are present. Curcumin I makes up the majority of the coloring agent (60%) along with trace amounts of curcumin III, curcumin II, and dihydrocurcumin. Zingiberene (25%), - phellandrene, sabinene, cineole, turmerone, turmerone and borneol are only a few of the mono- and sesquiterpenes found in the volatile oil. The essential oil's choleric effects are linked to -tolylmethyl carbinol. Additionally, the volatile oil contains curdione, curzerenone, curlone, camphene, AR-curcumenes, -curcumene, -curcumene, caryophyllene, limonene, terpinene, terpinolene, caryophyllene, eugenol, linalool, isoborneol and camphor. Turmerones, curzerenone, and both ^[22].

2.5.4 Uses - *Curcuma longa* Linn is said to possess a number of medicinal qualities. Medical professionals have employed rhizome of haridra as an anti-diabetic, hypolipidemic, anti-inflammatory, anti-diarrheal, hepatoprotective, anti-asthmatic, and anti-cancerous medicine ^[23].

2.5.5 Mechanism of action - A scientific and systemic investigation demonstrates that *Curcuma longa* freeze-dried rhizome powder diluted in milk has antidiabetic, hypolipidemic, and hepatoprotective effects and may be utilized as a strong and safe dietary supplement to treat diabetes. It is well-recognised that curcuminoids, glycosides, terpenoids, and flavonoids are present in *curcuma longa*. The isopropanol and acetone extracts of *Curcuma longa*

produced the greatest inhibition of the enzyme Human Pancreatic Amylase (HPA). This HPA inhibitory effect results in less starch breakdown, which lowers glucose levels [24].

2.5.6 Marketed Dosage form –

- i) Diabeta by Ayurvedic cure Ayurvedic herbal health products
- ii) Ojamin by Tates remedies

2.6 Kothala himbutu

- Kingdom – plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- celastrol
- Genus- *Salacia*
- Species- *reticulata*
- Synonym – kothala himbutu, svarna mula, saptarangi
- Biological source – root, leaves and steam of herb *Salacia reticulata*.
- Family- Celastraceae

2.6.1 Geographical source - In India, Sri Lanka, China, Thailand, Indonesia, and Brazil, *S. reticulata* is a widely distributed sizable woody climbing plant.

2.6.2 Morphology - The plant's smooth, white-lined bark is a greenish-gray color. A leaf typically measures 3 to 6 inches long and 1 to 2 inches wide. They are opposite and elliptic-oblong, with a sharp base and an abruptly acuminate apex. The margins are serrated with tiny rounded teeth, leathery, hairless, and shiny, and they have around seven pairs of lateral nerves that run along the underside of the leaf [25].

2.6.3 Phytochemistry - Pharmacological studies have identified salacinol, kotalanol, and mangiferin as the anti-diabetic components of *S. reticulata*. Other chemical components have also been found in the roots of *S. reticulata*, including 1,3-diketones, dulcitol, leucopelargonidin (a linear isomer of natural rubber), iguesterin (quinonemethides), epicatechin, phlorotannin, glycosidal tannins, triterpenes, 30-hydroxy-20(30) dihydroisoiguesterin, hydroxyferruginol [26].

2.6.4 Uses - Pharmacological studies have identified salacinol, kotalanol, and mangiferin as the anti-diabetic components of *S. reticulata*. Along with anti-diabetes it is used as an anti-asthmatic and treatment of joint pain and weight loss [27].

2.6.5 Mechanism of action - Salacia's stems and roots contain the aldose reductase inhibitor kotalgenin-16-acetate as well as salacinol and kotalanol, two highly effective glucosidase inhibitors. Salacinol and kotalanol competitively bind to α -glucosidase present in the brush borders of small intestine and prevent the breakdown of oligosaccharides into monosaccharides and thus, maintain normal blood levels in the human body. By using the enzyme aldose reductase, glucose is transformed into sorbitol (a sugar alcohol). Because sorbitol does not easily diffuse across cell membranes, it builds up in the lens and causes cataracts to form. Cataracts are avoided by kotalgenin-16-acetate's competitive binding to aldose reductase [28].

2.6.6 Marketed Dosage form

- i) Ojamin by Tates remedies
- ii) Zpter by Om Pharmaceuticals Limited

2.7 Bael

- Kingdom – Plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- spindales

- Genus- *Aegle*
- Species- *marmelos*
- Synonym – golden apple, stone apple
- Biological source – leaves and unripe or half-ripe fruits of plant *Aegle marmelos*.
- Family- Rutaceae

2.7.1 Geographical source - Existing both naturally and via cultivation are the Sub-Himalayan tract, India, particularly Central and Southern India, and Burma.

2.7.2 Morphology - The blooms are greenish white, 2 cm wide, bisexual, borne in clusters, and have a sweet-smelling aroma. The calyx is shallow, has five thin, board-shaped teeth, and is externally hairy. Petals are typically five (sometimes four), thick, oblong, oval, pale greenish white, and speckled with glands ^[29].

2.7.3 Phytochemistry - Alkaloids, sterols, mermesin, rutin, phenylethyl cinnamides, anhydromarmeline, aegelinosides, and essential oils are found in leaves. A coumarin known as aegelinol is found in the stem bark and roots. Psoralen, xanthotoxin, coumarins, tembamide, mermin, and skimmianine are other substances found in roots. Marmelosin A, B, and C, which is a furocoumarin makes up 0.5% of the medicines its main component. Marmesin, psoralin, and umbelliferone are other coumarins. Beta Sesquiphellandren, Carophyllene, Gamma Elemene, and Cyclohexane Quinoline, Tetracosane, Azulene, Quinohexane, Hexacosane, Nanocosane and tetracontane ^[30].

2.7.4 Uses - The Bael plant has incredible therapeutic potential in all of its sections. The herbal medicines made from bael are used to treat respiratory conditions, peptic ulcers, chronic diarrhoea, dysentery, and laxatives for astringency. The bael is also employed as a cancer preventative. Bael roots were responsible for the anti-inflammatory effects. Additionally, Bael extracts have demonstrated antiviral, antifungal, and antibacterial properties ^[31].

2.7.5 Mechanism of action - Aqueous extracts of bael seeds were used to further establish the anti-diabetic and anti-hyperglycemic properties. Bael leaves have also demonstrated a hyperglycemic effect; bael leaf extracts can reduce the expression of the Mi receptor gene and block the activities of aldose reductase, anticataract, and free radical scavengers, all of

which are linked to diabetes. The active ingredient in bael leaves that has antihyperglycemic properties is called Angeline-2 [32].

2.7.6 Marketed Dosage form –

- i) Madhumeha Kusumakara Rasa by shree dhootapapeshwar limited
- ii) Pancreatic tonic 180 cp by Ayurvedic herbal supplement

2.8 Indian gooseberry

- Kingdom – plantae
- Subkingdom - trachiobionta
- Division- mangoliophyta
- Class- Mangoliopsida
- Order- malpighiales
- Genus- *Phyllanthus*
- Species- *emblica*
- Synonym – amla, Malacca tree, emblic myrobalan
- Biological source – dried as well as fresh fruits of plant *Phyllanthus emblica*.
- Family- phyllanthaceae

2.8.1 Geographical source - *Phyllanthus emblica* is native to a wide region that stretches from southern China to Southeast Asia, including Nepal, India, and Sri Lanka. It is widely grown for its fruits, especially in India, the West Indies, Japan, and the Mascarene Islands (Mauritius).

2.8.2 Morphology - The tree is small to medium-sized and grows to a height of 1-8 m. The leaves are simple, sessile, and tightly packed along branchlets; they are light green in colour and resemble pinnate leaves. The branchlets are typically deciduous and 10-20 cm (3.9-7.9 in) long. The flowers are a yellowish-green color. The fruit has six vertical stripes

or furrows and is roughly spherical, pale greenish yellow, smooth, and firm in appearance [33].

2.8.3 Phytochemistry - It contains linolenic, linoleic, oleic, stearic, palmitic, and myristic fatty acids. Hydrolyzable tannins (Emblicanin A, Emblicanin B, punigluconin, and pedunculagin), flavonoids (Kaempferol 3 O alpha L (6"-methyl) rhamnopyranoside, Kaempferol 3 O alpha L (6"-ethyl) amnopyranoside), and alkaloids (Phyllantidine and Ballantine) are among the phytochemicals of this plant. The fruit of *Phyllanthus emblica* was used to isolate gallic acid, ellagic acid, 1Ogalloyl-beta-D-glucose, 3,6-diOgalloyl-D-glucose, chebulinic acid, quercetin, chebulagic acid, corilagin, and isostrictinnin. The methanolic extract of *P. emblica* leaves yielded a novel acylated glucoside. They were identified as apigenin-7-O-(6"-butyryl-beta)-glucopyranoside, gallic acid, methyl gallate, 1, 2,3,4,6-penta-Ogalloylglucose, and luteolin-4'-O-hesperidoside, along with four other known chemicals. *P. emblica* seeds have fixed oil, phosphatides, and a minor amount of essential oil. Aside from that Gallic, ellagic, chebulagic, and chebulinic acids are present in leaves. A novel, highly oxygenated norbisabolane called phyllaemblic acid was discovered in the roots of *P. emblica*, and spectroscopic and chemical methods were used to thoroughly characterize its structure. Ellagic acid and lupeol are found in *P. emblica* roots [34].

2.8.4 Uses - The plant contains a variety of bioactive substances. These substances have been proven to have a variety of pharmacological effects, including antimicrobial, antioxidant, anti-inflammatory, radio-protective, hepatoprotective, antitussive, immunomodulatory, hypolipidemic, and many other effects. Additionally, this medicinal plant is said to contain anti-HIV-reverse transcriptase, anti-cancer, antidiabetic, antidepressant, antiulcerogenic, wound-healing, and other actions [35].

2.8.5 Mechanism of action - Through its antioxidant and free radical scavenging activities, the Indian gooseberry, or amla, and several of its significant ingredients (such as gallic acid, Gallatin, ellagic acid, and corilagin), have anti-diabetic effects. The prevention or reduction of hyperglycemia, cardiac problems, diabetic nephropathy, neuropathy, cataractogenesis, and protein wasting have all been linked to amla [36].

2.8.6 Marketed Dosage form –

- i) Dabur Madhu rakshak by dabur
- ii) Zepter by om pharmaceuticals

3. Conclusion:

This review represents the identity and phytochemical nature of a typical medicinal plant which has been used for diabetes disease. The phytochemistry and pharmacological activity of this medicinal plant have been scientifically proven and the traditional dosage form belonging to these plants have been used by Ayurvedic physician. If polyherbal formulations of such medicinal plants are made available then it will be one of the promising steps by herbal industry and consumers will be satisfied to cure diabetes disease.

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