**‘‘HERBAL FORMULATIONS FOR MANAGEMENT OF DIABETES MELLITUS’’**

**Herbal products:** Herbal products comprise of herbal formulations made from one or more herbs.

**Herbal medications:** Ayurvedic herbal medications are defined as extracts from combination of herbs, single herbs, ayurvedic proprietary medicines or a compound of herbs in any form (tablets, capsules, powder, crude extract or decoction).1 The various part of herbs like roots, leaves, stems, barks are utilised for the preparation of the herbal medications.

Herbal formulations are the basis for finished herbal products and may include milled or pulvarised herbal materials, or extracts, tinctures and fatty oils of herbal materials.2 Herbal preparations are produced by extraction, fractionation, purification or concentration or by other physical or biological processes.3

Herbal materials include, in addition to herbs, fresh juices, gums, fixed oils, essential oils, resins and dry powders of herbs.4

**Herbs**

Herbs include crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered.5

**Diabetes mellitus**

Diabetes is a chronic, metabolic disease indicated by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves.

Diabetes is an illness where the insulin processing functions aberrantly due to pancreas not being able to secrete the hormone in adequate amounts. This in turn leads to uncontrollable levels of glucose or sugars in blood circulation and affects energy metabolism and kidney function in the affected individual.6

**Types of diabetes**

**Type 1 diabetes mellitus (T1D)** is an autoimmune disease that leads to the destruction of insulin-producing pancreatic beta cells. 7

**Type 2 Diabetes Mellitus (T2DM)** is one of the most common metabolic illness worldwide and its development is primarily caused by a combination of two main factors: faulty insulin release by pancreatic β-cells and the incapability of insulin-sensitive tissues to respond to insulin 8

**Gestational diabetes**

Gestational diabetes (GD) is a type of diabetes that develops in gestation when blood sugar magnitude gets too high. Gestational diabetes usually appears during the middle of pregnancy, between 24 and 28 weeks. Developing Gestational diabetes doesn't mean you already had diabetes before you got pregnant. This condition in fact appears because of the high blood sugar elevation during pregnancy.

**Prediabetes**

A condition in which blood sugar level has spiked, but is not sufficiently high enough to be type 2 diabetes. Without intervention, it's likely to lead to type 2 diabetes.

Diabetes mellitus can be managed by maintaining a healthy diet, avoiding junk food, following good sleep patterns, regular exercises etc.

Nowadays, diabetes mellitus can be managed by including nutraceutical substances in the diet.

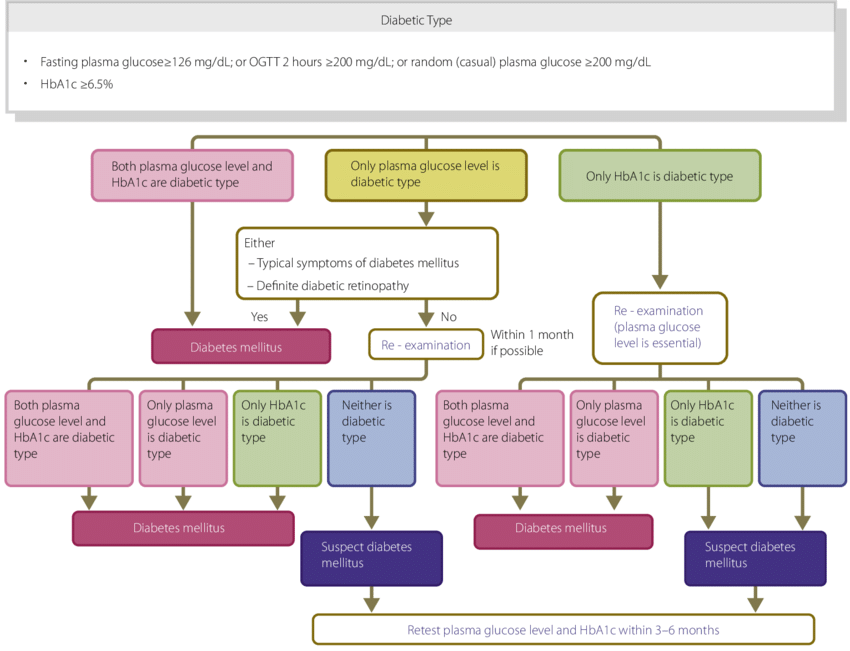
Some of these nutraceutical substances are sugar apple, curry leaves, amla, banana stem, bitter gourd etc.

How is diabetes diagnosed?14

• The detection of diabetes mellitus should be as extensive as possible. It is verified by the presence of chronic hyperactive glycemia, and by the presence of other factors, such as associated symptoms, clinical laboratory findings, a family history of diabetes, and body weight history of the patient. 9-13

For the diagnosis of diabetes, either of the following approaches shall be followed:

* Two assessments of the diabetic type in each patient (one blood glucose test is obligatory).
* One assessment of the diabetic type (with obligatory blood glucose testing) along with the presence of chronic hyperactive glycemic symptoms\*. (\*typical symptoms of chronic hyper-glycemia (e.g., dry mouth, polyposis, polyuria, body weight loss, or diabetic retinopathy).
* Substantiation of a prior diagnosis of ‘diabetes’.



Flow chart outlining the steps in the clinical diagnosis of diabetes mellitus. OGTT, Oral glucose tolerance test.14

How is hyper-glycemia assessed?

• The cases are to be classified into the normal type, borderline type, or diabetic type, according to the combination of fasting and 2-h post-75 g oral glucose tolerance test (OGTT) glucose values.

• The cases where fasting glucose values are 100–109 mg/dL (5.6–6.1 mmol/L) are classified into the ‘high - normal’ category as part of the normal type15.

• The OGTT is to be proactively considered in high-risk individuals (i.e., those who are suspected to have diabetes or the borderline type, those whose fasting glucose values are indicated to be ‘high-normal’, those with HbA1c values of ≥5.6%, cases with obesity or dyslipidemia, and those with strong family history of diabetes13).

• At present, HbA1c values are calculated by point-of-care testing (POCT) and devices are not to be used for the diagnosis13.

**GOALS AND STRATEGIES FOR DIABETES**

**MANAGEMENT**

**Q2-1 What are the objectives of diabetes management?**

**•The objectives of diabetes management are to improve meta-**

**bolic dysfunctions resulting from hyperglycemia, to prevent**

**the development or progression of diabetic complications and**

**conditions associated with diabetes, and to enable affected**

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**GOALS AND STRATEGIES FOR DIABETES MANAGEMENT**

What are the objectives of diabetes management?

• The objectives of diabetes management are to ameliorate metabolic dysfunctions rising from hyper-glycemia, to arrest the evolution or advancement of diabetic problems and conditions associated with diabetes, and to enable affected persons to maintain their quality of life (QOL) and life probability similar to those of healthy individuals.

How is a basic treatment strategy developed for each diabetic patient?

• The treatment strategy for diabetes may vary depending on the type, complaint condition, age, metabolic abnormality, and status of diabetic complications.

• Insulin remedy is to be given not only to cases who are insulin-dependent but also to pregnant cases, cases witnessing surgery that involves whole- body operation, and cases with severe infection, indeed if they aren't insulin-dependent. In addition, insulin remedy is to be given to those in whom glycemic pretensions aren't attainable with oral hypo- glycemic agents (OHAs) or glucagon- such as peptide 1 (GLP- 1) receptor agonists.

• OHA and/ or GLP- 1 agonist remedy is to be given to noninsulin-dependent cases in whom favourable glycemic control isn't attainable with acceptable medical nutrition therapy (MNT) and physical exertion/ exercise continued for 2 – 3 months. OHA and/ or GLP- 1 agonist remedy or insulin remedy may be given to these cases from the onset depending on the inflexibility of the metabolic complaint involved.

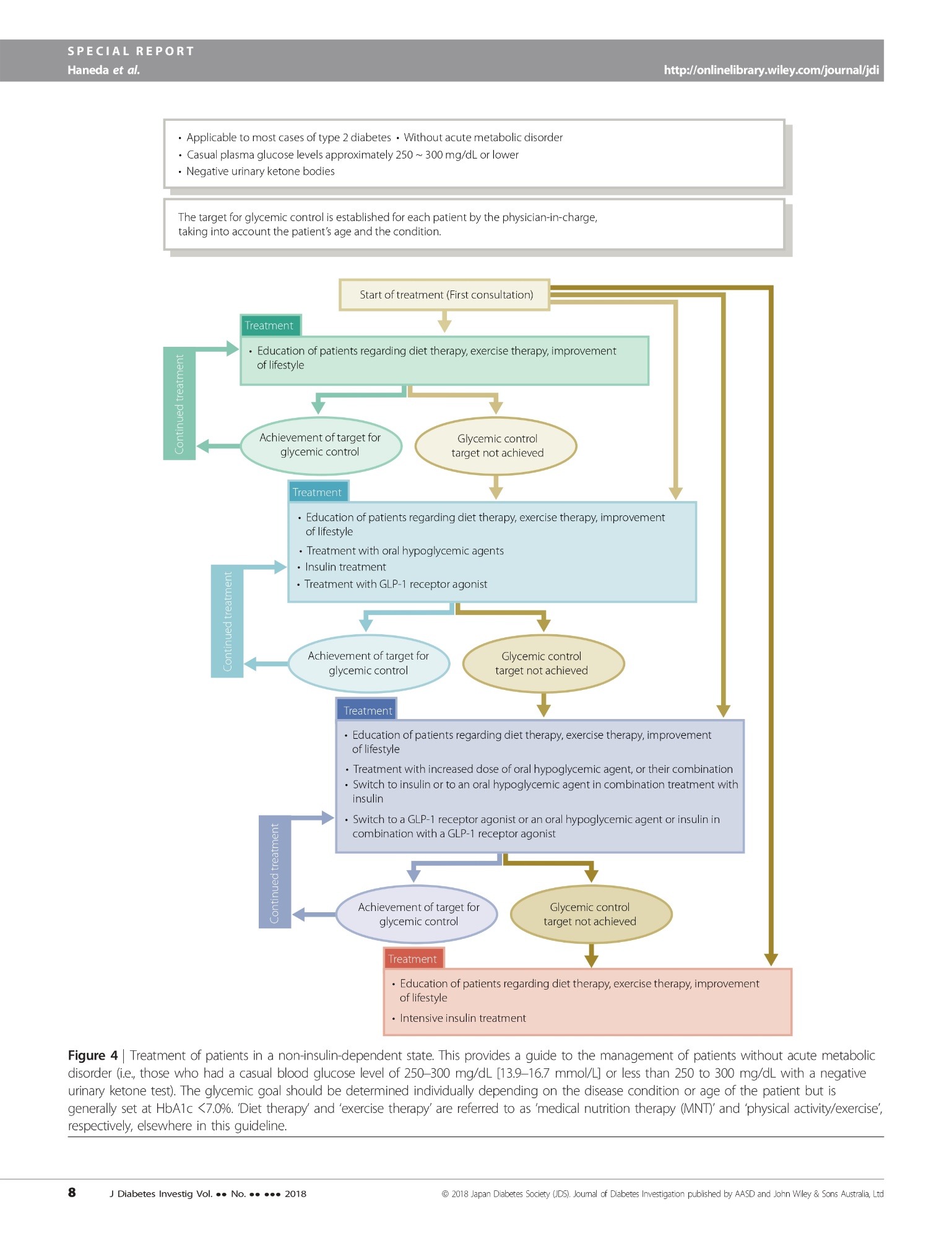
• Continued remedy is essential for cases with diabetes to help the onset or progression of complications. Team care- grounded diabetes education for these cases forms the foundation of their diabetes treatment.

**MEDICAL NUTRITION THERAPY (MNT)**

What is the part of MNT and the optimal nutritive balance in MNT for patients with diabetes?

• Carbohydrates, proteins and fats should account for 50–60%, ≤20%, and 20–30%, respectively, of the total energy intake in MNT for patients with diabetes.

• The ratios of macronutrients may vary depending on physical activities and the severity of diabetic complications, as well as on the food preferences of each patient with diabetes.14



Treatment of patients in a non-insulin-dependent state. This provides a guide to the management of patients without acute metabolic disorder14

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sl no | Scientific name | Common name | Family | Parts utilized | Activity | Ref  no |
|  |
| 1 | *Annona squamosa* Linn | Custard apple | [Annonaceae](https://en.wikipedia.org/wiki/Annonaceae) | Leaves, fruit | Leaf extracts show antidiabetic, cytotoxic, antimalarial, and immunosuppressive activities. | 16 |  |
|  |
| 2 | *Murraya koenigii* Linn | Curry leaves | Rutaceae | Leaves | Boost insulin activity | 17 |  |
|  |
| 3 | *Momordica charantia* Linn | Bitter gourd | [Cucurbitaceae](https://en.wikipedia.org/wiki/Cucurbitaceae) | Fruit, vegetable | Mimics insulin and aids in glucose utilization | 19 |  |
|  |
| 4 | *Phyllanthus emblica* Linn | Amla | Phyllanthaceae | Fruits, leaves | stimulates pancreatic insulin secretion, and restores and regenerates β-cells | 20 |  |
| 5 | *Musa sapientum* Linn. | Banana | Musaceae | Plant stem, fruit, flower | induced blood sugar reduction may be due to possible inhibition of free radicals and subsequent inhibition of tissue damage induced by alloxan | 18 |  |
|  |
| 6 | *Punica granatum*  Linn. | Pomegranate | Lythraceae | Fruit, leaves | action on β-cells of pancreas that stimulates insulin release and decreases glucose unacceptance. | 21 |  |
| 7 | *Beta vulgaris*  Linn. | Beetroot | [Amaranthaceae](https://www.google.com/search?sa=X&sca_esv=558639794&bih=651&biw=1366&hl=en-US&q=Amaranthaceae&stick=H4sIAAAAAAAAAONgVuLUz9U3MMwuKix-xGjCLfDyxz1hKe1Ja05eY1Tl4grOyC93zSvJLKkUEudig7J4pbi5ELp4FrHyOuYmFiXmlWQkJqcmpgIA72urc1QAAAA&ved=2ahUKEwjKh6Sx3uyAAxU04zgGHXcADooQzIcDKAB6BAgUEAE) | Tap root | It is a good source of fibre which helps to increase satiety and slow down the absorption of carbohydrates preventing sudden spikes in blood sugar levels | 22 |  |
| 8 | *Withania somnifera*  Linn. | Ashwagandha | Solanaceae | Root | Reduce blood sugar to normal levels by boosting insulin synthesis and sensitivity | 23 |  |
|  |
| 9 | *Acacia Arabica* Linn. | Babul | Fabaceae | Bark, pulp | slow down any glucose absorption and support a keto diet by keeping insulin spikes at bay | 24 |  |
| 10 | *Allium cepa* Linn. | Onion | Amaryllidaceae | Bulb | improve insulin sensitivity and regulate blood glucose level | 25 |  |
| 11 | *Allium sativum* Linn. | Garlic | Amaryllidaceae | Bulb | Lower blood glucose level, stimulate insulin activity | 26 |  |
| 12 | *Aloe vera*  (L.) Burm.f. | Aloe vera | Asphodelaceae | leaves | lowers blood glucose levels in diabetic patients. improves the responsiveness of the body tissues towards insulin | 27 |  |
| 13 | *Syzygium cumini* Linn | Jamun | Myrtaceae | Leaves, fruits, seeds | slow down the rate of sugar released into the blood and increase the insulin levels in the body | 28 |  |
| 14 | *Butea monosperma*  (Lam.) Taub. | Palasa | Fabaceae | Flowers, leaves | It might reduce blood sugar levels by improving glucose tolerance and regulation of excessive blood sugar levels | 29 |  |
| 15 | *Bombax diffusa* | semul | Malvaceae | Flowers | lower the hyperlipidemic problems associated with diabetes mellitus., enhance the insulin release | 30 |  |
| 16 | *Areca catechu*  Linn | supari | Arecaceae | Nut | Reduce the blood sugar level | 26 |  |
| 17 | *Artemisia pallens* Wall. ex DC. | Davana | Asteraceae | Leaves and flowers | significant blood glucose lowering effect | 26 |  |
| 18 | *Trigonella foenum graceum*  Linn | Fenugreek | Fabaceae | Seeds and leaves | activating of insulin synthesis and promote its release from the pancreatic β-cells | 31 |  |
| 19 | *Gymnema sylvestre*  R. Br. | Gurmar | Apocynaceae | Leaves | delaying the glucose absorption in the blood. | 32 |  |
| 20 | *Chamaecostus cuspidatus*  (Nees & Mart.) C.Specht & D.W.Stev. | Insulin plant | Costaceae | Whole plant | Reduce the blood sugar level | 33 |  |
| 21 | *Abroma agustum* Linn | Abroma agusta | Steruliaceae | Root | Hypoglycemic and antilipidemic effect | 34 |  |
|  |
| 22 | *Acer saccharum* Marshall | Sugar Maple | Sapindaceae | Juice | Hhypoglycemic and antioxidant effect | 35 |  |
| 23 | *Coccinia indica*  (L.) Voigt | Ivy gourd | Cucurbitaceae | Leaves | Antioxidant, antihyperglycemic and antilipidemic | 36 |  |
| 24 | *Acalypha wilkesiana* Müll.Arg. | Copperleaf | Euphorpiaceae | Leaves | Hypoglycemic and antioxidant | 37 |  |
| 25 | *Acorus calamus* Linn*.* | Sweet flag | Acoraceae | Leaves/bark | *α*-Glucosidase inhibition and hypolipidemic | 38 |  |
| 26 | *Aegle marmelos*  (L.) Corrêa | Bael | Rutaceae | Leaves/bark/root | Antidiabetic, Antioxidant and anti cataract activity | 39 |  |
| 27 | *Afzelia Africana* Sm. | African mahogany | Fabaceae | Stem bark | Antidiabetic and hematological effect | 40 |  |
| 28 | *Eriobotrya japonica* (Thunb.) Lindl. | Japanese Loquat | Rosaceae | Leaves | Antihyperglycemic | 41 |  |
| 29 | *Prosopis glandulosa* Torr. | Honey mesquite | Fabaceae | Leaves | Increase insulin secretion | 42 |  |
| 30 | *Amaranthus spinosus Linn.* | Spine amaranth | Amaranthaceae | Leaves | *α*-Amylase inhibition, antioxidant and anticholesrolemic | 43 |  |
| 31 | *Anogeissus acuminate*  (Van Heurck & Müll.Arg.) Gere & Boatwr  *(terminalia phillyreifolia)* | Button tree | Combretaceae | Whole plant | Antioxidant | 44 |  |
| 32 | *Artemisia Linn.* | Artemisia sphaerocephala krasch | Compositae | Gum/seed powder | Antidiabetic | 45 |  |
| 33 | *Artemisia dracunculus*  Linn. | Tarragon | Asteraceae | Aerial part | Antidiabetic | 46 |  |
| 34 | *Artemisia herba-alba* Asso. | White wormwood | Asteraceae | Whole plant | Antihyperglycemic and antihyperlipidemic | 47 |  |
| 35 | *Lonicera japonica* Thunb. | Japanese honeysuckle | Caprifoliaceae | Whole plant | *α*-Glucosidase inhibition | 48 |  |
| 36 | *Ascophyllum nodosum*  Linn. | Rockweed | Algae | Young tips | *α*-Glucosidase inhibition and *α*-amylase | 49 |  |
| 37 | *Aspidosperma macrocarpon* Mart. | Guatambu | Apocynaceae | Steam/Bark Root wood | *α*-Amylase inhibition | 50 |  |
| 38 | *Atractylodes macrocephala* Koidz. | Bai Zhu | Asteraceae | Whole plant | *α*-Glucosidase inhibition | 48 |  |
| 39 | *Azadirachta indica* A.Juss. | Neem | Meliaceae | Leaves, flower and seed | Antidiabetic and antihypertension | 51,52 |  |
| 40 | *Barringtonia racemose Linn.* | Common Putat | Lecythidaceae | Seed | *α*-Glucosidase and *α*-amylase inhibition | 53 |  |
| 41 | *Bauhinia forficate* | Brazilian orchid tree | Leguminosae | Leaves | Antidiabetic | 26 |  |
| 42 | *Belamcanda chinensis*  Linn. | Blackberry lily | Irdaceae | Leaves | Hypoglycemic | 54 |  |
| 43 | *Benincasa hispida* (Thunb.) | Wax gourd | Cucurbitaceae | Fruit | Antidiabetic, ameliorate the derangement in lipid metabolism in diabetics. | 55 |  |
| 44 | *Nervilia plicata* | Pleated Leaf Nervillia | Orchiaceae | Stem | Antidiabetic | 56 |  |
| 45 | *Berberis vulgaris* Linn. | Barberry | Berberidaceae | Leaves | Hypoglycemic | 57 |  |
| 46 | *Psoralea corlifolia*  Linn. | Purple Fleabane | Fabaceae | Leaves | Antioxidant | 39 |  |
| 47 | *Rauwolfia serpentinum*  Linn. | Indian snakeroot | Apocyanaceae | Leaves | Hypoglycemic | 58 |  |
| 48 | *Silybum marianum*  Linn. | milk thistle | Asteraceae | Whole plant | Antihyperglycemic | 59 |  |
| 49 | *Argyreia cuneate* Ker Gawl. | purple morning glory | [Convolvulaceae](https://en.wikipedia.org/wiki/Convolvulaceae) | Whole plant | Antihyperglycemic | 60 |  |
| 50 | *Desmodium gangeticum* Linn. | salparni | [Fabaceae](https://en.wikipedia.org/wiki/Fabaceae) | Whole plant | Antidiabetic | 61 |  |

These are commonly available from the plants, in the market etc which can be used directly, or can be processed at home, and can be used in form of decoction, powder, etc

1. *Annona squamosa* Linn.16

**Synonym:** Sweetsop, Custard Apple

**Biological source:** It comprises of dried leaves of *Annona squamosa* Linn. belonging to family [Annonaceae](https://en.wikipedia.org/wiki/Annonaceae)

**Phytochemical constituents:** anonaine, annonacin, squamocin, asimicin, phytochemical assessments have emphasised that numerous active compounds, such as acetogenins and flavonoids.

**Description:** *Annona squamosa* Linn.  is a small tree, which is well branched belonging to the family [Annonaceae](https://en.wikipedia.org/wiki/Annonaceae" \o "Annonaceae) that bears edible fruits called [sugar-apples](https://en.wikipedia.org/wiki/Sugar-apple) or sweetsops. It tolerates a tropical flat climate and it is the most widely cultivated of its species. *Annona squamosa* Linn. is a small, semi-[deciduous](https://en.wikipedia.org/wiki/Deciduous), branched shrub or small tree 3 to 8 metres (10 to 26 feet) tall.

**Formulation:** decoction

* Decoction preparation
* Chop the leaves into small pieces
* boil the leaves in water for about 5-10 min
* consume the freshly prepared decoction

1. *Murraya koenigii* Linn.17

**Synonym:** karivepaaku, karibevu kadi patta

**Biological source:** It comprises of dried leaves of *Murraya koenigii* Linn belonging to family Rutaceae

**Phytochemical constituents:** alkaloids, glycosides, steroids, tannins and terpenoids monoterpenes. linalool, elemol, geranyl acetate, myrcene, α-terpinene (E)-β-ocimene.

**Description:** It’s a small tree, growing 4–6 metres (13–20 ft) in height, with the trunk up to 40 cm (16 in) in width. The [leaves](https://en.wikipedia.org/wiki/Leaves) are [pinnate](https://en.wikipedia.org/wiki/Pinnation), aromatic, with 11–21 leaflets, each leaflet 2–4 cm (3⁄4–1+1⁄2 in) long and 1–2 cm (1⁄2–3⁄4 in) broad

**Consumption:**

* the leaves can be directly be consumed orally
* the leaves can be included in diet in the dishes
* the leaves can be dried, crushed into powder and can be consumed with water.



1. *Momordica charantia* Linn.19

**Synonym:**  bitter apple, bitter gourd, karela,

**Biological source:** It comprises of the fruits and leaves of *Momordica charantia* Linn. belonging to family Cucurbitaceae

**Phytochemical constituents:** polysaccharides, saponins, and phenolics cucurbitane-type triterpenoids, cucurbitane-type triterpene glycosides, phenolic acids, flavonoids, essential oils, fatty acids, amino acids, sterols, saponins and protein

**Description**: The tree is medium in size, reaching 1–8 m (3 ft 3 in – 26 ft 3 in) in height. The branches are finely pubescent (not [glabrous](https://en.wikipedia.org/wiki/Glabrousness" \o "Glabrousness)), 10–20 cm (3.9–7.9 in) long, usually deciduous. The leaves are simple, [subsessile](https://en.wikipedia.org/wiki/Sessility_(botany)" \o "Sessility (botany)) and are present close along branchlets, light green in colour, exhibit [pinnate](https://en.wikipedia.org/wiki/Pinnation) leaves. The flowers are greenish-yellow. The fruit is nearly spherical, light greenish-yellow, fairly smooth and hard on appearance.

**Juice preparation:**

* Take a fresh bitter gourd, chop into pieces
* Combine the bitter gourd and half cup of water in a mixer
* Prepare a blend
* Strain by adding little water
* And consume immediately

1. *Phyllanthus emblica* Linn.20

**Synonym:**  Indian gooseberry, āmalakī, emblic myrobalan

**Biological source:** It comprises of the fruits and leaves of *Phyllanthus emblica* Linn. belonging to the family phyllanthaceae.

**Phytochemical constituents:** ellagic acid, emblicanine A, emblacani B, Gallic acid, phyllantine, quercetin and phyllantidine

**Description:** the tree is medium in size, reaching 1–8 m (3 ft 3 in – 26 ft 3 in) in height. The branches are finely pubescent (not [glabrous](https://en.wikipedia.org/wiki/Glabrousness" \o "Glabrousness)), 10–20 cm (3.9–7.9 in) long, usually deciduous. The leaves are simple, [subsessile](https://en.wikipedia.org/wiki/Sessility_(botany)" \o "Sessility (botany)) and set nearly along the branches, resembling [pinnate](https://en.wikipedia.org/wiki/Pinnation) leaves, and are light green in appearance. The flowers are greenish-yellow. The fruit is nearly globular, light greenish-yellow, quite smooth and hard on appearance, with six vertical stripes or furrows

**Consumption**

Eat the fruit fresh:

This is the greatest and the efficient method for the consumption of amla

Amla juice:

* first remove the seed
* crush the pulp
* extract the juice by blending and straining with water

Amla powder:

* Take fresh amla fruits
* Cut into pieces
* Sun-dry the amla pulp
* grind it into a fine powder.

1. *Musa sapientum* Linn.18

**Synonym:**  Common banana

**Biological source:** It comprises of the fruit, stem of *Musa sapientum* Linn. belonging to family  [[Musaceae](https://en.wikipedia.org/wiki/Musaceae)](https://en.wikipedia.org/wiki/Cucurbitaceae)

**Phytochemical constituents:** phenolics, carotenoids, biogenic amines and phytosterols

**Description:** The banana plant is among the largest blossomy flowering plant. All aerial parts of the plant grow from a structure usually called a "[corm](https://en.wikipedia.org/wiki/Corm)". Plants normally have a good height and are fairly sturdy with a [treelike](https://en.wikipedia.org/wiki/Tree) appearance, but what appears to be the trunk is actually a "false stem" or [pseudo-stem](https://en.wikipedia.org/wiki/Pseudostem). Bananas grow in a wide variety of soils, as long as the soil is at least 60 centimetres (2.0 ft) deep, has good water supply and isn’t compacted. Banana plants are one of the rapidly growing of all plants, with diurnal surface growth rates recorded of 1.4 square metres (15 sq ft) to 1.6 square metres (17 sq ft).

**Consumption**

* Blend chopped banana stem with water
* Untill it becomes a smooth paste.
* Add some plant-based buttermilk and salt.
* Mix well and drink it immediately.

1. *Punica granatum* Linn.21

**Synonym:** Malum granatum, Punica granatum, anar

**Biological source:** It comprises of fruits and leaves of *Punica granatum* Linn belonging to family Lythraceae

**Phytochemical constituents:** [Punicalagin](https://www.google.com/search?sca_esv=558639794&cs=0&q=Punicalagin&stick=H4sIAAAAAAAAAONgVeLUz9U3sDArzEsyUizIz01NL0rMSyxJVUjOSM3NTE7MUUjOzysuySwpTc0rKT7FiFB-ipFXP13f0DA9OaMqPqvE8BQjN4hvZGyYnh6ffIqRC6TSvNikIrsKps3YPL4QyjY3y86tgiqqyq2MLzGCcrJyDDIKyqEcIwuD9GwjmPa8-OL0R4xvGLkFXv64Jyz1iHHSmpPXGG8zcgn45OcXp-ZUBqXmAJ2eEpIvJMbF5poHdHWlEI8UFxcH2ODyvHihIC7u4NSSkHzf_JTMtEohZyFHLk7f1Nyk1KJi_zQhAy4u5_ycnNTkksz8PCElKQUuOf1kuIA-LEjik_NzC_JL81KKrZg0mJQijdx2XZp2js1BkAEIzrQGO0hpaAlysbnk5yZm5gkaLP06_--z9_ZawlwcIYkV-Xn5uZWC4YwMDfv_v7dX4uQE6jkg-hsozzCBibFp34pDbBwcjAIMRkwcDFUMPItYuQNK80C2JqZn5k1gYwQAdeN_xrMBAAA&sa=X&ved=2ahUKEwjcmquB2OyAAxX78DgGHTE3BokQ7fAIegQIABAR), [Ellagic acid](https://www.google.com/search?sca_esv=558639794&cs=0&q=Ellagic+acid&stick=H4sIAAAAAAAAAONgVeLUz9U3sDA2jy80UizIz01NL0rMSyxJVUjOSM3NTE7MUUjOzysuySwpTc0rKT7FCFFuVpiXdIqRVz9d39AwPTmjKj6rxPAUIzeIb2RsmJ4en3yKkQuk0rzYpCK7CqYNZAuUbW6WnVsFVVSVWxlfYgTlZOUYZBSUQzlGFgbp2UYw7XnxxemPGN8wcgu8_HFPWOoR46Q1J68x3mbkEvDJzy9OzakMSs0BOj0lJF9IjIvNNQ_o6kohHikuLg6wweV58UJBXNzBqSUh-b75KZlplULOQo5cnL6puUmpRcX-aUIGXFzO-Tk5qcklmfl5QkpSClxy-slwAX1YkMQn5-cW5JfmpRRbMWkwKUUaue26NO0cm4MgAxCcaQ12kNLQEuRic8nPTczMEzRY-nX-32fv7bWEuThCEivy8_JzKwXDGRka9v9_b6_EyQnUc0D0N1CeYQITY9O-FYfYODgYBRiMmDgYqhh4FrHyuObkJKZnJiskJmemTGBjBAC6IY46tAEAAA&sa=X&ved=2ahUKEwjcmquB2OyAAxX78DgGHTE3BokQ7fAIegQIABA9), [Cyanidin](https://www.google.com/search?sca_esv=558639794&cs=0&q=Cyanidin&stick=H4sIAAAAAAAAAONgVeLUz9U3sMiLL043UizIz01NL0rMSyxJVUjOSM3NTE7MUUjOzysuySwpTc0rKT7FCFFuVpiXdIqRVz9d39AwPTmjKj6rxPAUIzeIb2RsmJ4en3yKkQuk0rzYpCK7CqbN2Dy-EMo2N8vOrYIqqsqtjC8xgnKycgwyCsqhHCMLg_RsI5h2kCMfMb5h5BZ4-eOesNQjxklrTl5jvM3IJeCTn1-cmlMZlJoDdHpKSL6QGBebax7Q1ZVCPFJcXBxgg8vz4oWCuLiDU0tC8n3zUzLTKoWchRy5OH1Tc5NSi4r904QMuLic83NyUpNLMvPzhJSkFLjk9JPhAvqwIIlPzs8tyC_NSym2YtJgUoo0ctt1ado5NgdBBiA40xrsIKWhJcjF5pKfm5iZJ2iw9Ov8v8_e22sJc3GEJFbk5-XnVgqGMzI07P__3l6JkxOo54Dob6A8wwQmxqZ9Kw6xcXAwCjAYMXEwVDHwLGLlcK5MzMtMycybwMYIAHy0qoawAQAA&sa=X&ved=2ahUKEwjcmquB2OyAAxX78DgGHTE3BokQ7fAIegQIABAE). Liteolin, organic acids, phenolic acids, sterols, terpenoids, fatty acids, triglycerides, alkaloids and some other compounds.

**Description:** *Punica granatum* Linn. is a [shrub](https://en.wikipedia.org/wiki/Shrub) growing 5 to 10 m (16 to 33 ft) in height, and has multiple spiny branches and is long-lived, with some species in France have survived for 200 years. *Punica granatum* Linn. [leaves](https://en.wikipedia.org/wiki/Leaf) are opposite or subopposite, glossy, narrow oblong, entire, 3–7 cm (1+1⁄4–2+3⁄4 in) long and 2 cm (3⁄4 in) broad. The [flowers](https://en.wikipedia.org/wiki/Flower) are bright red and 3 cm (1+1⁄4 in) in diameter, with three to seven petals. Some fruitless species of *Punica granatum* Linn. are grown only for obtaining the flowers.

Consumption:

Pomegranate tea:

* Add 3 mugs of pomegranate seeds to a blender.
* Store the juice in a vessel after straining.
* Combine three-fourth mug of piping hot water with one-quarter mug of pomegranate juice.



1. *Beta vulgaris* Linn.22

**Synonym:** Beetroot, common beet, or garden beet

**Biological source:** It comprises of taproot portion of a *Beta vulgaris* Linn. belonging to family [Amaranthaceae](https://www.google.com/search?sa=X&sca_esv=558639794&bih=651&biw=1366&hl=en-US&q=Amaranthaceae&stick=H4sIAAAAAAAAAONgVuLUz9U3MMwuKix-xGjCLfDyxz1hKe1Ja05eY1Tl4grOyC93zSvJLKkUEudig7J4pbi5ELp4FrHyOuYmFiXmlWQkJqcmpgIA72urc1QAAAA&ved=2ahUKEwjKh6Sx3uyAAxU04zgGHXcADooQzIcDKAB6BAgUEAE)

**Phytochemical constituents:** betalains (e.g., betacyanins and betaxanthins), flavonoids, polyphenols, Saponins and inorganic Nitrate (NO3)

**Description:** Beets, *Beta vulgaris* Linn. are blossoming root vegetables in the family Chenopodiaceae grown for their consumable root. The plant leaves are seen growing on stems and is usually upright with a long main root. The leaves are arranged alternately on the stem, ovoid shaped and grow 20–40 cm (7.9–15.7 in) in length. The roots are usually red in colour. The plant produces stalkless green flowers that can grow 1–2 m (3.3–6.6 ft) in height. Beets are usually grown as yearly plants, harvested after one growing season. Beets may also be referred to as beetroot, garden beet or spinach beet and originated from the Mediterranean.

**Juice preparation:**

* Take a fresh beetroot, chop into pieces
* Combine the beetroot and half cup of water in a mixer
* Prepare a blend
* Strain by adding little water
* And consume immediately

1. *Withania somnifera* Linn23



**Synonym:** Ashwagandha or winter cherry,

**Biological source:** Ashwagandha is derived from the root of the *Withania somnifera* Linn plant*s* belonging to family [Solanaceae](https://en.wikipedia.org/wiki/Solanaceae)

**Phytochemical constituents:** steroidal lactones, alkaloids, saponin, flavonoids, tannin, starch, phenolic content, carbohydrate, withanolides, sitoindosides, anaferine, anahygrine, β-sitosterol, chlorogenic acid, cysteine, cuscohygrine, pseudotropine, withanine, scopoletin

**Description:** This species is a 35–75 cm (14–30 in) tall growing shrub. [The](https://en.wikipedia.org/wiki/Tomentose) branches expand spirally from the central stem. Leaves appear to be dull green, elliptic, usually up to 10–12 cm (3.9–4.7 in) long. The flowers are small in size, green coloured and bell-shaped. The fruit becomes orange-red on ripening.

**Usage**

* Take one glass of milk and upto its half volume water in a pan and bring it to boil.
* Introduce Ashwagandha root powder, upto 1/2 teaspoon and boil for additional 5 minutes.
* To the admixture add around (2 teaspoons) crushed walnut and almonds
* Drink this admixture to maintain blood sugar level.

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