EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 11
Issue: 6
123-130
Year: 2024

FORMULATION AND EVALUVATION OF ANTIDIABETIC HERBAL SYRUP

Take Mayuri Ashok*, Tambe Kalyani Arun and Mundada Shraddha A.

Dr. N. J. Paulbudhe College of Pharmacy, Ahmednagar, Maharashtra.

***Corresponding Author: Take Mayuri Ashok**
Dr. N. J. Paulbudhe College of Pharmacy, Ahmednagar, Maharashtra.

Article Received on 01/04/2024 **Article Revised on 21/04/2024** **Article Accepted on 11/05/2024**

ABSTRACT
Diabetes mellitus is found in all parts of the world and is becoming a serious threat to mankind health. This disease affects people all over the world and is a big health concern. These diseases caused by the deficiency of production of insulin by pancreas which results in increase or decrease in concentration of glucose in the blood. There are many medicines available to control it, but total recovery from diabetes has not been reported up to this date. Some chemical agents have severed side effect. Alternate to this synthetic agent, many herbal plants [natural plants] with hypoglycaemic properties are known from across the world. Diabetes mellitus is a long-lasting condition where the body struggles to handle blood sugar properly. This happens because of high blood sugar levels, which can lead to diabetes. A recent study looked into making a herbal syrup to help with diabetes using extracts from guava leaves and dried seeds of Syzygium cumini. We formulated three different syrups (F1, F2, F3) and evaluvated the formulated syrup for various tests like PH, colour, odour, viscosity, density. The syrups were tested, and lab tests were done (Evaluation test).

1. INTRODUCTION

Our bodies have ways to fight damage caused by certain molecules, but sometimes its not enough, leading to diseases like diabetes. This illness affects a lot of people and is expected to keep increasing. The diabetes, the body struggle with insulin, which controls blood sugars the most common type type2, happens when the body doesn't make or use insulin properly.

The world health organization says that by 2025, there might be around 300 million or more people with diabetes. Right now, treatments include insulin, and some pills, but they can have serious side effects so, that scientists are looking for better and safer medicines for diabetes. One enzyme, aldose reductase, plays a role in diabetes complications by causing a substance called sorbitol to build up in the body, leading to problems like cataracts and nerve damage. Some plants have been found to help lower blood sugar, and researcher are studying how they work these plants have natural substances that might act like insulin or help with how insulin works. Lots plants-more than 400kinds-have been looked at for their ability to lower blood sugar. Scientists are interested in these plants because they contain different natural medicines these compounds include things like glycosides, alkaloids, and flavonoids, which are believed to have an effect on diabetes.

Classification of diabetes mellitus

1. B-cell destruction (Type 1 diabetes IDDM) (a) Immune mediated (b) Idiopathy
2. Insulin resistance (Type 2 diabetes - NIDDM)
3. Genetic defects of B-cell function (a) Glucokinase (b) Hepatocyte nuclear transcription factor-4 a (c) Insulin promoter factor (d) Mitochondrial DNA (e) Proinsulin or insulin conversion
4. Genetic defects in insulin processing or insulin actions defects in (a) Proinsulin conversion. (b) Insulin gene mutation (c) Insulin receptor mutation.
5. Exocrine pancreatic defects
6. Endocrinopathy (a) Acromegaly (b) Cushing syndrome (c) Hyperthyroidism (d) Pheochrmocytoma (e) Glucocanonama
7. Infections (a) Cytomegalovirus (b) Coxhacivirus
8. Drugs (a) Glucocorticoid (b) Thyroid hormone (c) Thiazides (d) Phenytoins
9. Genetic syndrome associated with diabetes (a) Down's syndrome (b) Kleinfelter's syndrome (c) Turner's syndrome
10. Gestational diabetes mellitus

Causes of diabetes

Multi-factorial, involving several predisposing conditions and risk factors. In many cases genetics, habits and environment may all contribute to a person's diabetes.

A. Type 1 diabetes
happens when the body's defines system attacks the cells in the pancreas that make insulin Family history might make someone more likely to get it, but it's not as common as with Type 2 diabetes.

B. Type 2 diab
Things like high blood pressure, high fat in the blood, and giving birth to a big baby can increase the risk. Eating lots of fatty foods, drinking a lot, not moving much, being overweight, and getting older can also lead to Type 2 diabetes.

Signs and Symptoms
Early detection and treatment of diabetes can decrease the risk of developing the complications of diabetes. The following symptoms of diabetes are typical However, some people with type 2 diabetes have symptoms so mild that they go unnoticed.

Common symptoms of diabetes
Feeling very thirsty
Feeling very hungry even though you are eating.
Extreme fatigue
Blurry vision.
Cuts/bruises that are slow to Hea.
Weight loss even though you are eating more (type 1)
Tingling, pain, or numbness in the hands/feet (type 2)

Complications of diabetes
The complications of diabetes mellitus are far less common and less severe in people who have well-controlled blood sugar levels. 17, 18 1. Micro vascular Complications-
Diabetic Retinopathy
Diabetic Nephropathy
Diabetic Neuropathy

2. Macro vascular complications
Atherosclerosis
Cardiovascular Disease (CVD)
Stroke

Pathophysiology of diabetes
Normal insulin release: The pancreas releases insulin in response to food, especially when there's glucose in the blood from the food you've eaten. Insulin helps cells take in glucose from the blood to use as energy.

Glucose as energy: Glucose is a key energy source for our body. It comes from carbs in food and is used right away or stored for later use.

Role of insulin: Insulin helps cells absorb glucose, use it for energy, or store it. When insulin is low, the liver releases stored glucose back into the blood Glucagon's role: Glucagon does the opposite of insulin. It raises blood glucose levels by releasing stored glucose when needed.

Impact of insulin issues: If there's not enough insulin, or the body doesn't respond. well to it, glucose can't enter cells properly. This leads to high blood sugar levels and problems with the body's normal functions.

Consequences of high blood sugar: High blood sugar affects the kidneys, causing glucose in the urine (glycosuria) and increased urine production (Polyuria), among other metabolic issues like poor protein synthesis and acidosis.

Diabetes diagnosis
The blood glucose levels of a healthy man are 80mg/dL on fasting and up to 160 mg. /dL. in the postprandial state. A number of laboratory tests are available to confirm the diagnosis of diabetes.
1. Finger stick blood glucose.
2. Fasting plasma glucose.
3. Oral glucose tolerance test.
4. Glycosylated haemoglobin or haemoglobin ALC.

Diabetes medications
Many different types of medications are available to help lower blood sugar levels in people with type 2 diabetes. Each type works in a different way. It is very common to combine two or more types to get the best effect with fewest side effects.
Sulfonylurea: These drugs stimulate the pancreas to make more insulin.
Biguanides: These agents decrease the amount of glucose produced by the liver.
Alpha-glucosidase inhibitors: These agents' slow absorption of the starches and glucose.
Thiazolidinediones: These agents increase sensitivity to insulin.
Meglitinides: These agents stimulate the pancreas to make more insulin.
D-phenylalanine derivatives: These agents stimulate the pancreas to produce more insulin more quickly.

Amylin synthetic derivatives: Amylin is a naturally occurring hormone secreted by the pancreas along with insulin. An amylin derivative, such as pramlintide (Symlin), is indicated when blood sugar control is not achieved despite optimal insulin therapy.

Incretin mimetics: Exenatide (Byetta) was the first incretin mimetic agent approved in the United States. It is indicated for diabetes mellitus type 2 in addition to metformin or a sulfonylurea when these agents have not attained blood sugar level. control alone.

Insulins: Synthetic human insulin is now the only type of insulin. It is less likely to cause allergic reactions than animal-derived varieties of insulin used in the past. Different types of insulin are available and categorized according to their times of action onset and duration. Examples of rapid-acting insulins -
Regular insulin (Humulin R. Novolin R)
Insulin lispro (Humalog)

Insulin aspart (Novolog)
Insulin glulisine (Apidra)
Prompt insulin zinc (Semilente, slightly slower acting) Examples of
intermediate-acting insulins -
Isophane insulin, neutral protamine Hagedorn (NPH) (Humulin N, Novolin N)
Insulin zinc (Lente) Examples of long-acting insulins -
Extended insulin zinc insulin (Ultralente)
Insulin glargine (Lantus) Insulin detemir (Levemir) 23, 24

Diabetes treatment
Treatment involves medicines, diet, and exercise to control blood sugar and prevent symptoms and problems.
Diabetes diet: A healthy diet is a key to controlling blood sugar levels and preventing diabetes complications.
Diet: Eat regularly, with balanced meals high in fiber and low in unhealthy fats and sugary foods. If weight loss is tough, ask a professional for help.
Exercise: Even just 20 minutes of walking three times a week helps a lot. It lowers diabetes risk and keeps complications away.
Control Blood Sugar: Keeping your sugar levels stable daily is the best thing for diabetes.
Quit smoking: Smoking makes diabetes worse. If needed, seek help to quit.
Maintain Healthy Habits: Keep a healthy weight, drink enough water, watch salt intake, take care of your skin, teeth, and feet.
Alcohol: Limit alcohol as it can mess with blood sugar levels.
Keep Track: Check blood sugar levels regularly and keep a log of what you eat, when you take meds, and any issues you face.
Get educated: When diagnosed, your healthcare team will teach you how to manage diabet

Benefits of Black Jamun and Guava leaf

1. May help manage diabetes
Jamuns are best known for their ability to regulate blood sugar level. Macrobiotic Nutritionist and Health Practitioner, Shilpa Arora says, "Jamun seeds contain compounds called jamboline and jambosine that reduce the rate at which sugar is released into the bloodstream. Jamun seeds also increase the production of insulin.

2. Boosts stomach health
Jamun seeds can be used to manage a number of stomach-related issues effectively. Jamuns are rich is fibre content that helps improve the functioning of the digestive system. Jamun seeds can also be used as oral medication to combat sores, inflammation and ulcers in the intestines.

3. Helps regulate blood pressure
Jamun seeds may prove to be a boon for people dealing with hypertension as the seed extract of the fruit contains a type of antioxidant called ellagic acid that may help in keeping a check on rapid fluctuations of blood pressure.

4. May boost immunity
Jamun seeds contain powerful antioxidants like flavonoids and also phenolic compounds that help keep harmful free radicals at bay

5. Guava helps boost your immunity
Guava is rich in vitamin C and is said to contain four times the content of vitamin C found in oranges. Vitamin C helps boost immunity levels that prepare your body to fight common infections and pathogens. Also, more vitamin C helps in good eyesight.

6. May reduce the risk of developing cancer
Vitamin C, lycopene and other types of polyphenols act as antioxidants that help in neutralising infections in the body that prevent the growth of cancerous cells. Guava fruit has been shown to prevent prostate cancer and also prevents the growth of breast cancer cells.

7. Helps to manage blood sugar levels
Guava has a high content of fibre and glycaemic index that helps prevent the development of diabetes. You may refer to Glycaemic Index Food Chart to find out the Gls of other foods and modify your diet accordingly. Fibre content regulates blood sugar levels from spiking, while glycaemic index also restricts your blood sugar to rise at a short.

8. Helps during constipation
Guavas contain high amounts of good dietary fibre when compared to other fruits. One guava a day contains 12 per cent of fibre intake that makes it highly beneficial for digestive health. It also helps in healthy bowel movements. This reduces your risk of constipation.

Advantages of black jamun and guava leaf
Jamun Seed Powder offers a plethora of jamun seed benefits, including diabetes control, blood pressure regulation, boosted haemoglobin levels, antioxidant power, detoxifying properties, anti-inflammatory benefits, support for cardiovascular health, richness in essential vitamins, and assistance in weight management.
May Help Lower Blood Sugar Levels.
May Boost Heart Health.
May Help Relieve Painful Symptoms of Menstruation.
May Benefit Your Digestive System.
May Aid Weight Loss.
May Have an Anticancer Effect.
May Help Boost Your Immunity.

Disadvantages

1. It may lead to constipation and gut issues
Jamun, like most other fruits, contains a good amount of fiber. And if taken in excess, this nutrient can affect the gut lining, making jamun hard to digest. This phenomenon may further lead to constipation, irritability, bloating, and other gut issues.

2. It may disrupt the blood sugar levels in the body
Jamun has a low glycaemic index, making it perfect to add to a diabetes-friendly diet. Besides, it also helps convert the carbs to energy, which further lowers our blood sugar levels. But having too much of it may decrease the glucose level excessively, further leading to weakness in the body. This condition is also known as hypoglycaemia.

3. It is prone to bacterial contamination, make us crave for sugar and some places guava is not available. It can also cause diarrhoea or irritable bowel syndrome.

Plan of work

Selection of herbal drug

⇩

Selection of method of preparation for herbal syrup

⇩

Preparation of herbal syrup

⇩

Evaluvation of herbal syrup

⇩

Collection of Data and Project tyeping

Literature survay

1. DK Patel, SK Prasad, R Kumar, and S Hemalatha
Diabetes mellitus is one of the common metabolic disorders acquiring around 2.8percet of the world population and anticipated to cross 5.4 percent by the year 2025. since long back herbal medicine have been the highly esteemed source of modern high-tech medicine the review also discussion the management aspect of diabetic mellitus using these plants and their active principles.

2. Pritesh parel, Pinal harde, Jagath Pillai and Bhagirath patel
Traditional medicines derived from medicinal plants are used by about 60% of the world's population. This review focuses on Indian herbal drugs and plants used in the treatment of diabetes, especially in india. A list of medicinal plants with proven antidiabetic and related beneficial effects and of herbal drugs used in treatment of diabetes is compiled. These eg. include Allium sativum, Eugenia jambolana, Momordica charantia, Ocimum sanctum.

3. Kamlesh laxmikant khadke, Waghmode D. M. Dr. Santosh Jain
Carbohydrates, lipids and proteins. It is a condition that impairs the body's ability to process blood glucose as result of this increased blood glucose level occurs in our body, which causes a diabetes mellitus. The present study reveals to develop an Polyherbal anti-diabetic herbal syrup by using an extract plant parts. herbal plant is used in formulation is potent antidiabetic action over synthet.

4. Khedkar Dhanshree., Khandagale Gorakhanath., Mr. Bansode G. V.
Diabetic herbal preparation adds to researchers' existing knowledge. Anti-diabetic compounds with antioxidant properties are more beneficial, as one of the etiologies involved in the development of diabetes and its complications is damage caused by free radicals.

5. Shirur Dakappa Shruthi, Adhikari Roshan, Sanjay Sharma Timilsina, and Sajjekhan Sunita
Psidium guajava is an important food crop and medicinal plant available in tropical and subtropical countries, widely used in food and folk medicines around the world. It contains important phytoconstituents such as tannins, triterpenes, flavonoid. diseases. Many pharmacological studies have demonstrated the ability of this plant to exhibit antioxidant, hepatoprotective, anti-allergy, antimicrobial, antigenotoxic, antiplasmodial, cytotoxic, antispasmodic, cardioactive, anticough, antidiabetic, anti-inflammatory and antinociceptive activities, supporting its traditional uses. Suggesting a wide range of clinical applications for the treatment of infantile rotaviral enteritis, diarrhoea and diabetes.

3. MATERIALS AND METHOD

Syzygium syzygium (Jambul)
Synonyms-Black jam

Biological source-Jamun, Syzygium Cumini
Family- Myrtaceae parts used seeds, leaves, fruits, and bark.
Geographical source- Thistree is known to have grown in Indian subcontinent and in other regions of South Asia such as Nepal, Burma, Sri Lanka, Indonesia, Pakistan, and Bangladesh from ancient time.

Scientific classification

a) Kingdom: Plantae
b) division- Magnoliophyta
c) Class: Magnoliopsida
d) Order. Myrtales
e) Family: Myrtaceae
f) Genus: Syzygium
g) Species: cumini

Chemistry- The plant is rich in compounds containing anthocyanins, glucoside, ellagic acid, isoquercetin, kaempferol, myricetin, andhydrolysable tannins (1-0-galloyl castalagin and casuarinin).

The seeds also contain alkaloid jambosine and glycoside jamboline, which slows. down the diastatic conversion of bounce into sugar.

The blood glucose-lowering effect of Eugenia jambolanamay be due to increased secretion of insulin from the pancreas or by inhibition of insulin degradation.

Psidium guajaval Guava

Synonym-Guajava pyrifera
Scientific Name- Psidium guajaval

Biological Source-Guava trees are native to tropical America and are grown in tropical and subtropical areas worldwide. Guava fruits are processed into jams, jellies, and preserves and are common pastry fillings
Family myrtalecae
Plant parts used-leaves, bark, whole parts.
Geographical sources- It is now cultivated in Southern Florida, Bermuda, and throughout the West Indies from the Bahamas and Cuba to Trinidad, and south to Brazil.

Scientific classification

a. Kingdom- Plantae
b. Order myrtales
c. Family- myrtalecac
d. Genus -Psidium
e. Species-P. guajava.

- Chemistry- Antidiabetic Constituent-Polyphenol compound. Antidiabetic properties of Guava leaves Reduced blood glucose level, increased plasma insulin level in an oral glucose tolerance test, and stimulated activities of some glucose metabolic enzymes. Guava contains broad spectrum of phytochemicals including minerals, enzymes, proteins29, sesquiterpenoid alcohols and triterpenoid acids30,31,32, alkaloids, glycosides, steroids, flavonoids, tannins, saponins33,34. Guava is very rich in antioxidants and vitamins and also high in lutein, zeaxanthine and lycopene 35,36. The guava leaves contain several chemical constituents such as a-pinene, B-pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene, B-bisabolene, caryophyllene oxide, B-copanene, farnesene, humulene, selinene, cardinene and curcumene, mallic acids, nerolidiol, ßsitosterol, ursolic, crategolic, and guayavolic acids, cineol, quercetin, 3-L-4-4-arabino furanoside (avicularin) and its 3-L-4-pyranoside (essential oil), resin, tannin, eugenol.

Formulation of nutritional suppliment

Preparation of jamun seed powder

Step 1: Separate seeds from fruits
↓
Step 2: Sun dry the seeds
↓
Step 3: Peel off the outer shell
↓
Step 4: Dry the inner core
↓
Step 5: Make a powder
↓
Step 6: Store it in dry place

Preparation of guava powder

Step1: Collecting of psidium gujava l. leaves
↓
Step 2: Washing (Distilled water)
↓
Step 3: Drying of leaves
↓
Step 4: Grinding
↓
Step 5: Sieving
↓
Step 6: Storage

Method of preparation

1. In our formulation we select the active ingredients jamun and guava leaf powder. the black jamun seeds powder used to treat diabetes. Active ingredients present in jamun seed are jamboline and jambosine that shows down the rate of sugar released into the blood and increase the insulin level.
2. Guava leaf powder is help to manage blood sugar level.
3. Take 5gm of guava leaf powder and 5gm of Indian black jamun seed powder, then mix it with a 500ml of purified water. Boil the mixture until the volume becomes ¼ of initial volume and cool the decoction and filter it by using a filter paper. Filtrate obtained from the boiled mixture is used to prepare a final polyherbal solution.

4. Preparation of flavour solution: 1.5 ml of orange oil in 2.5 ml of propylene glycol was prepared separately.
5. Preparation of simple syrup with sodium saccharin: Mix 3. 3gm of sodium saccharin with 10 ml of distilled water to prepare a concentrated solution and added to mixing vessel.
6. Preparation of poly herbal syrup: Filtrate was taken and added to mixing vessel containing simple syrup, and stir it thoroughly and then add excipients like sodium benzoate (2.5gm), and add the flavour solution to the mixing vessel and finally add an colouring agent i.e. amaranth solution (0.1) ml, and then finally make up the value upto 50 ml with purified water

Formulation table

Formula No 1:

Ingredient	Quantity
Active ingredient	7 ml
Propylene glycol	12.5 ml
Orange oil	0.75 ml
Amaranth solution	1-2 drops
Sodium benzoate	1.25 gm
Saccharine sodium	1.65 ml
Purified water	q.s

Formula No 2:

Ingredient	Quantity
Active ingredient	15 ml
Propylene glycol	3 ml
Orange oil	2 drops
Amaranth solution	1-2 drops
Sodium benzoate	3 gm
Saccharine sodium	3 gm
Purified water	q.s

Formula No 3:

Ingredient	Quantity
Active ingredient	10 gm
Propylene glycol	2.5 ml
Sodium benzoate	2.5 gm
Orange oil	1.5 ml
Amaranth solution	1-2 drops
Saccharine sodium	3.3 gm
Purified water	Upto 50 ml

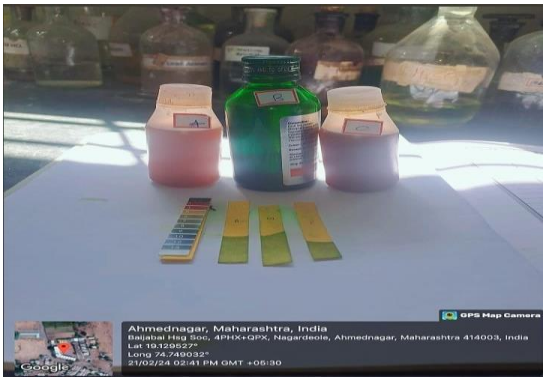
Evaluation parameters

Colour: 5 ml of final syrup was taken in a watch glass and placed under light, and colour is observed by naked eye.

Odour: 2 ml of final syrup was smelled individually and then the odour can be detected.

Taste: A pinch of final syrup was placed on the taste bud of tongue to identify the taste.

Determination of pH: Take 5 ml of final syrup in the volumetric flask and make the volume up to 50ml with purified water. The pH can be determined by using digital pH meter.



Determination of viscosity

Viscosity of herbal syrup can be determined by using an Ostwald viscometer. Ostwald viscometer is thoroughly cleaned with chromic acid or acetone. Viscometer should be placed in a vertical position in a suitable stand. Fill the water upto the mark in dried viscometer. Now note the time required for water to flow from mark A to mark B. Repeat the process for 3 times, to obtain accurate reading. Now wash the viscometer and fill it with herbal syrup, and then note the time required for syrup to flow from mark A to mark B.

Determination of density

The density of syrup can be determined by using a pycnometer. Clean the pycnometer (Specific gravity bottle with chromic acid and nitric acid, and rinse with purified water. Note the weight of empty dry bottle (w1). Fill the pycnometer with 10 ml of water and weigh it (w2). Finally note the weight of bottle with 10 ml of syrup (w3)

Formula for density

wl-Weight of empty specific gravity bottle

w2-Weight of empty specific gravity bottle + 10 ml of water.

w3-Weight of empty specific gravity bottle + 10 ml of syrup.

Density of solution = w3-w1/w2-w1* density of water

Determination of specific gravity

Formula for specific gravity

Specific gravity =w3/w2

4. RESULT

All the formulation showed dark colour due to plant extract. The PH of formulation (F1, F2, F3,) varies from 6.1-6.2 may be due to varied percentage of acidic or basic compound.

Present in aqueous extract.

The viscosity of formulation (F1, F2, F3) varies from 50.7-56.6.

The density of formulation (F1, F2, F3) varies from 1.14-1.21.

5. CONCLUSION

Half of the world's population uses herbal medicines because they're easier to take and cause fewer side effects than synthetic ones. We Formulate a syrup for diabetes using extracts from Guava leaves and Indian Black jamun seeds, which help to cure diabetics.

The formulated syrups with formula F1, F2 were evaluated for PH, viscosity, density, colour, odour, taste and found to be unstable.

The syrup with formula F3 was found to be stable with all evaluation parameters.

Sr. No	Evaluation parameters	Formulation 1	Formulation 2	Formulation 3
1	colour	pale Brown	pale Brown	Dark Brown
2	odour	Aromatic	Aromatic	Aromatic
3	taste	Lightly Bitter	Lightly Bitter	Intence Bitter
4	PH	6.3	6.3	6.2
5	viscosity	1.14	1.16	1.18
6	density	1.16	1.14	1.21

Half of the world's population uses herbal medicines because they're easier to take and cause fewer side effects than synthetic ones. We Formulate a syrup for diabetes using extracts from Guava leaves and Indian Black jamun seeds, which help to cure diabetics.

The formulated syrups with formula F1, F2 were evaluated for PH, viscosity, density, colour, odour, taste and found to be unstable.

The syrup with formula F3 was found to be stable with all evaluation parameters.

Future scope

The future scope of antidiabetic syrup lies in continued research and development to improve effectiveness, minimize side effects, and enhance convenience for patients, possibly The antidiabetic syrup lies in continued research and development to improve effectiveness, minimize side effects, and enhance convenience for patients, possibly incorporating advanced drug delivery systems or novel therapeutic targets. incorporating advanced drug delivery systems or novel therapeutic targets.

Market Trends and Demand

The global diabetes epidemic has fuelled a growing demand for alternative treatments, including herbal remedies. Consumers are increasingly seeking natural solutions with fewer side effects than conventional medications. As a result, the market for anti-diabetic herbal products is expected to continue expanding in the coming years.

Consumer preferences

Consumer preferences are shifting towards natural and organic products across various industries, including healthcare. Many people prefer herbal remedies due to their perceived safety and efficacy, as well as their minimal environmental impact. Anti-diabetic herbal syrups cater to these preferences by offering a natural alternative to synthetic medications.

Scientific research

While traditional herbal remedies have been used for centuries to manage diabetes, scientific research into their efficacy is ongoing. Studies have shown promising results for several herbs commonly used in anti-diabetic formulations, such as Indian black jamun, guava leaf

REFERANCE

1. Patel DK, Prasad SK, Kumar R and Hemantha S, an overview on antidiabetic medicinal plants having insulin mimetic property Asian Pacific Jarmal of Tropical Biomedicine, 2.
2. Patel P, Harde P, Pillai J, Darji N and Patel Antidiabetic herbal drugs a review Pharmacophore (An International Research Journal), 18, 19, 21, 23, 24, 26.
3. Khaki K, Waghmare D.M., Dr. Jain Formulation and evaluation of antidiabetic herbal decoction international journal of innovative research in technology June, 2023; 10, 1: 2349-6002, 533, 534.
4. Khedkar D. Khandagale G, Mr. Bansode G. V. A Review of Herbal Drug used in the Diabetes Treatment: International Journal of Research Publication and Reviews, November, 2023; 3075, 3078, 3079, 4, 11: 3071- 3080.
5. Jagetia Phytochemicals composition and pleotropic pharmacological properties of Jamun, 2017; 2: 54- Evid Based Complement Alternat Med, 2016; 2016: 7382506. Published online 2016.
6. Przeor MSome common medicinal plant with antidiabetic activity, known and available in Europe [a mini review] Journals/pharmaceuticals/volume15/ issue 1/10.3390/Ph 1501006
7. Dasappa S, Adhikari R, Sharma S Timilsina, and Saehan SA review on the medicinal plant Psidium guajava linn [Myrtaceous] Journal of Drug Delivery & Therapeutics, 2013; 3(2): 162-168, 162, 162, 16.
8. Ahmed. B, Hossain. M, Islam R, Kumar Saha A, Mandl. A review on natural sweetener plant- stevia having medicinal and commercial importance. Glasnik A1-2/2011, 1954; Issn 002-76.
9. Kazmi A, Ali Khan M, Mohammad S, Ali A and Ali H Biotechnological production of natural calorie free radical stevia glycosides in stevia reburial; an update on current scenario. Current biotechnology, 2019; 8: 70-84-71.
10. Antidiabetic Herbal Drugs and Polyherbal Formulation Used for Diabetes: A Review Dwivedi C, Daspaul. S The Journal of Phytopharmacology, rajesham V. nath. R, anisette d. Bishwanath Review on medicinal plant and herbal drug formulation used in diabetes mellitus, 2013; 2(3): 44-51, 15.
11. https://in.docworkspace.com/d/sIEqRwfVm16_0sA Y
12. https://images.app.goo.gl/ByTRUGK2k77JB15k6
13. https://images.app.goo.gl/empjwT8ufSChJZbA6
14. https://arizoneinternational.com/blog/benefits-of-jamun-seed-powder
15. https://images.app.goo.gl/W2bFcd6eSa1Mo3FK