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Formulation And Evaluation Of Polyherbal Antidiabetic Syrup

1Prof.Somnath Shriram Davkhar, 2Miss,Sharayu Bhosale, 3Mr>.Umesh Bhawar, 4Dr.Hemant Gangurde

1Assistant Professor

1Abasaheb Kakade College of B Pharmacy Bodhegaon,

2Abasaheb Kakade College of B Pharmacy Bodhegaon,

3Abasaheb Kakade College of B Pharmacy Bodhegaon,

4Abasaheb Kakade College of B Pharmacy Bodhegaon

- **Abstract:**

Diabetes mellitus is a persistent metabolic condition marked by elevated blood sugar levels and modified metabolism of carbohydrates, fats, and proteins. It is a situation that hinders the body's capability to manage blood sugar because of this elevated blood sugar level that happens in our body, leading to diabetes mellitus. The current

research demonstrates to create a Polyherbal anti-diabetic herbal syrup by utilizing an extract from the leaves of Gymnemasylvestre and the dried seeds of

Syzygiumcumini. Three formulations of herbal syrup were created (F1, F2, F3) Herbal plants utilized in the formulations demonstrate a powerful anti-diabetic effect compared to synthetic ones. F1, F2, F3 formulations were created and assessed. Assessment criteria of these formulations were determined to be within the acceptable limits and in vitro investigations were conducted for identifying anti-diabetic efficacy.

Formulation and Evaluation of Polyherbal Antidiabetic Syrup

- Introduction:

Diabetes is a group of chronic diseases caused by elevated blood sugar levels over a long period of time. Diabetes occurs when the pancreas does not produce enough insulin or when the body's cells do not respond properly to insulin. Diabetes is an inappropriate metabolic disease characterized by changes in carbohydrate, lipid and protein levels. The treatment of diabetes mellitus is finally a cooling period of the world, and its good result is a real achievement that can be seen. New drugs, including insulin and oral hypoglycemics, affect the sugar society in search of the golden pot because they are prescribed in the same way and act as disgusting people. There are many different herbs and spices that have been proven to help with diabetes. Diabetes mellitus (DM), a major disease worldwide, is characterized by hyperglycemia associated with impaired insulin secretion and/or insulin action, including to changes in the metabolism of carbohydrates, proteins and lipids. Several reports suggest that the incidence of DM will increase in the coming years globally, especially in India. It is estimated that nearly 57 million Indians will be affected by diabetes by 2025. Among diabetic patients, coronary heart disease is the leading cause of death Lipid disorders are often associated with diabetes. Lipid abnormalities in these patients include hypertriglyceridemia and decreased levels of high-density lipoprotein (HDL) cholesterol. Although the lipid profile appears to be better and glycemic control is improved, this usually does

not occur. Since there is a strong relationship between various types of cancer in patients with diabetes and hyperlipidemia, the diagnosis and treatment of these diseases is important. In addition, hyperlipidemia is a factor in the increase in vascular diseases seen in diabetic patients. Diabetic nephropathy is the leading cause of morbidity and mortality in diabetes. The pathogenesis of diabetic nephropathy Diabetic nephropathy is the main cause of problems related to diabetes, which is related to chronic hyperglycemia and hemodynamic changes in the microcirculation of the kidney and changes structures in the glomerulus. Hypoglycemic drugs can cause adverse effects, including hematological effects, hypoglycemic coma, and liver and kidney disease. In addition, it is not suitable for use during pregnancy. Compared to synthetic chemicals, herbal products are less toxic and have fewer side effects. Herbal medicines play an important role in the development of effective medicinal products. In addition, their ability to prevent many diseases has been proven. Early humans began their research into diseases and their cures, but there is no evidence that early humans used herbal remedies for their illnesses. It is best to use herbal remedies individually to get maximum benefit from their combined abilities to reduce the side effects of each other. Taking the above information into consideration, a multi-natural herbal preparation was developed. Immunity is caused by excessive disease and is also a major problem worldwide, leading to atherosclerosis and other cancers such as heart disease, stroke and other problems related to health. There are many research projects in herbal medicine. Identification of active compounds from plant sources is still a challenge. Therefore, better research authentication of all plants and extracted compounds is needed. The issue of interaction between medicinal plants and medicinal plants is also an important topic that requires more knowledge and study, such as polypharmacy and polyherbism. New technologies such as nanotechnology and new emulsification methods are used in the production of herbal products, which mainly affect the bioavailability and potency of herbal components, and this should also be studied. This may lead to the re-examination of some of the products that have failed previous tests, which can be re-examined and redesigned using new technologies to see if they can be changed for the better and less side effects Today, there is a great need to create safer drugs to treat many diseases. Therefore, there is a great need for medicinal evaluation of various plants used in traditional medicinal systems.

Blood glucose level :

Fasting blood glucose level: 90 to 130 mg/dL Blood glucose level after 2 hours with a meal greater than or equal to 150 mg/dL.

❖ Signs And Symptoms:

- Weight loss
- Polyuria (Increased urination)
- Polydipsia (Increased thirst)
- Polyphagia (Increased hunger)
- Loss of vision
- Slow healing of wounds
- Itchy skin
- Fatigue

❖ Types:

Type 1 : Insulin Dependent Diabetes mellitus [IDDM]

This is an autoimmune disease in which antibodies destroy the beta cells of the islets of Langerhans in the pancreas, due to a lack of insulin. In other words, the pancreas cannot produce enough insulin.

Type 2 : Non-insulin Dependent Diabetes mellitus [NIDDM]

Diabetes is an adult and most patients are overweight. It reduces the sensitivity of the tissues to insulin, impairing the production of insulin.

Type 3 : Gestational Diabetes mellitus.

Occurs around 20-24 weeks of pregnancy under term when hormones increase insulin resistance.

❖ **Pathophysiology:**

- Insulin is the main hormone that controls the entry of sugar from the blood into the cells of the body, and is important in balancing the level of sugar in the body.

- Insulin is secreted into the blood by the beta cells of the islets of Langerhans in the pancreas.

- Decreased insulin production from beta cells causes glycogen to be broken down into glucose. Due to the lack of insulin, sugar does not enter the body's cells properly, which leads to poor protein synthesis and high blood sugar levels. An increase in the osmotic pressure of the urine increases the loss of water, resulting in dehydration (polydipsia) due to the flow of water from other parts of the body.

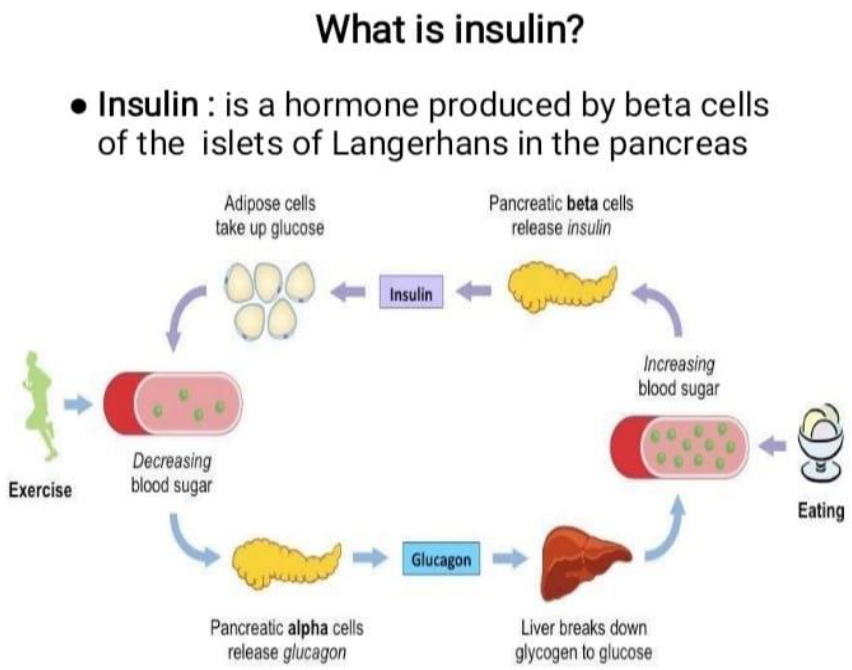

Fig (1) Mechanism of insulin

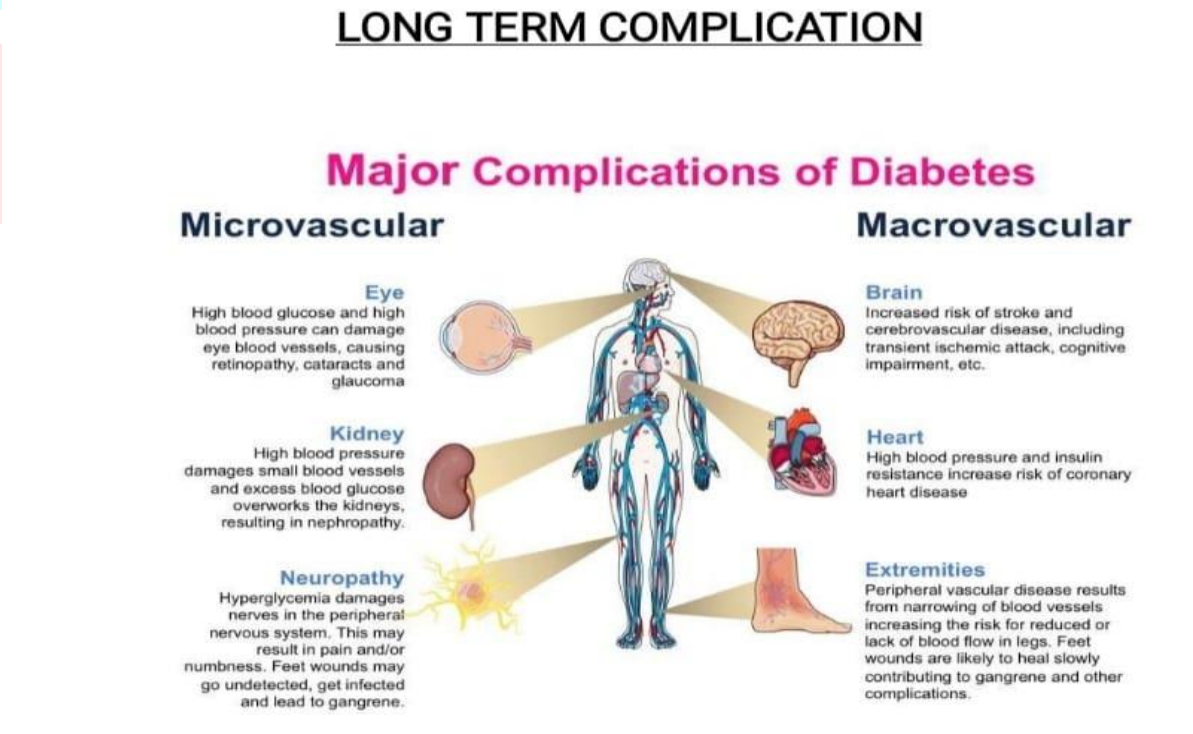

Fig (2) Complications of Diabetes

Syrup:

Syrup is a viscous, thick aqueous solution of nearly the same concentration as sucrose, containing 66.7% sugar by weight.

➢ Types of syrup:

- **Medicated syrup :**

Medicinal syrups are similar to sugar in water, in which drugs and medicines dissolve. It is intended for oral use.

- **Herbal syrup :**

A herbal syrup is made by mixing its thick decoction with honey, sugar or alcohol. It is intended for oral use. Herbal syrups are stronger than other types of syrups.

❖ **Advantages :**

- Good patient compliance.
- They are more palatable .
- Disguised the bad taste of medication.

❖ **Disadvantages :**

- During storage it causes an crystallization of the sugar within a screw cap
- Not suitable in emergency and unconscious patients .
- Delayed onset of action because absorption takes time.

- INGREDIENTS USED IN HERBAL SYRUP :

Following ingredients are used in Polyherbal anti-diabetic syrup are listed below:

▪ **GYMNEMA SYLVESTRE: [Meshashringi]**

Meshashringi leaves have a strong hypoglycemic effect on diabetic patients. Eating these leaves improves insulin levels and glucose metabolism. The active ingredient in Meshashringi leaves is Gymnemicacid, which helps in controlling blood sugar levels. It also blocks sugar receptors in our taste buds. Can be used for type 1 and type 2 diabetes.

Fig (3) Meshashringi leaves

- **SYZYGIUM CUMINI : [Indian Black Jamun]**

The dried black seeds of jamun are used to treat diabetes. The active ingredients in jamon seeds are jambolin and jambosin, which reduce the rate of glucose release into the blood and increase insulin levels.

Fig (4) Black Jamun seeds

- **PROPYLENE GLYCOL:[Stabilizer]**

This liquid is green, colorless, odorless and slightly sweet in taste. It is often used as an additive and stabilizer in food and to help retain moisture in formulations. It is used in medicine and cosmetic products.

Fig (5) Propylene glycol

- **METHYL PARABEN: [Preservative]**

It is often used as a preservative in oral medications, inhibits the growth of microbes, and is used as a food additive and antifungal agent in the food and pharmaceutical industries.

Fig (6) Methyl paraben

- **PIPPERMENT OIL : [Flavoring agent]**

Peppermint is an essential oil extracted from the leaves of the peppermint plant, a member of the mint family. It can be used in the form of peppermint oil for aromatherapy.

Fig (7) Pipperment oil

- **ERYTHROSINE : [Coloring agent]**

A pink color used to color foods made from charcoal. An organic compound containing iodine and sodium. It is used in the pharmaceutical industry

Fig (8) Erythrosine

- **SACCHARIN SODIUM:[sweetener]**

Sodium saccharin is an artificial sweetener that is 500 times sweeter than sugar, but has no caloric value and is used as a 1% diluted solution. Stable and non-toxic, it is used in preparations for diabetes and slimming foods.

Fig (9) Saccharin sodium

❖ PLANT PROFILE:

Table 1: Plant Profile of Polyherbal anti-diabetic syrup

S.NO.	Plants	Biological Sources	Chemical Constituent	Uses
1.	Meshashringi	Gymnemasylvestre	Gymnemic acid , Lupeol, Anthraquinone, Flavones, Stigmasterol, Dammarene, Pentatriacontane, Hentriacontane, 5- Deoxyinositol	Used to treat diabetes, metabolic syndrome, cough, malarial fever. Used to reduce weight loss, Antidote for snake bite , It acts as an digestive, stimulant, laxative, appetite suppressant and diuretic.
2.	Indian Black jamun	Syzygiumcumini	Ellagic acid, Gallic acid, Myricetin, kaempferol, Oleanolicacid ,Petunidin, Beta – sitosterol, Delphinidin.	Used to treat type 2 diabetes mellitus, worm infection, asthma, diarrhoea, cough and cold. It is an anthelmintic, and also used to treat ulcers, dysentery, bronchitis. It purifies blood.

❖ EXCIPIENT PROFILE:

Table 2: Excipient profile of Polyherbal anti-diabetic syrup

S.NO.	Excipients	Uses
1.	Propylene glycol	Food additive Drug stabilizer Preservative
2.	Methyl paraben	Preservative Antifungal preservative Prevents germ growth
3.	Pipperment oil	Flavouring agent Topical analagesic Anti pruritic
4.	Erythrosine	Coloring agent Biological stain Printing ink
5.	Saccharin sodium	Artificial sweetener Low calorie value

❖ Materials And Method:

❖ **Plant materials:**

- Gymnemasylvestre (Meshashringi)
- Syzygiumcumini (Indian black Jamun)
- Propylene glycol
- Methyl paraben
- Pipperment oil
- Erythrosine
- Saccharin sodium
- Purified water

Table 3:Formulation table of herbal syrup:

S.NO.	Ingredients	Quantity
1.	Meshashringi leaf power	5gm
2.	Indian black jamun	5gm
3.	Propylene glycol	2.5ml
4.	Methylparaben	2.5gm
5.	Pipperment oil	1.5ml
6.	Erythrosine	0.1ml
7.	Saccharin sodium	3.3gm
8.	Purified water	Upto 50ml

❖ Evaluation parameters of polyherbal syrup:

- **Colour:**

  Take 5 ml of the last syrup in a watch glass and place it under the light, the color is visible to the naked eye.

- **Odour:**

  2 ml of the final syrup was smelled separately and the odor was detected.

- **Taste:**

  A final dose of syrup is placed on the taste buds of the tongue to determine the taste.

- **Determination of pH:**

  Pour 5 ml of the final syrup into a volumetric flask and make up to 50 ml with distilled water. The pH can be determined using a digital pH meter.

- **Determination of viscosity:**

  The viscosity of vegetable syrup can be determined using an Ostwald viscometer. The Ostawald viscometer is thoroughly cleaned with chromic acid or acetone. The visometer must be placed on a proper stand. Fill the viscometer with water that has been dried in place. Now find the time it takes for the water to flow from point A to point B. Repeat this process three times to get the correct reading. Now clean the viscometer and fill it with vegetable syrup and then record the time it takes for the syrup to flow from point A to point B.

  Formula for viscosity:

  Density of syrup × Time required to flow syrup × viscosity of water

  Viscosity = ----------

  Density of water × Time required to flow water

- **Determination of density:**

  The density of the syrup can be determined using a pincometer. Wash the pincometer (bottle of specific gravity) with chromic acid and nitric acid and rinse with distilled water. Record the weight of the empty dry bottle (w1). Fill the pincometer with 10 ml of water and weigh (w2). Finally, record the weight of the 10 ml syrup bottle (w3).

Formula for density

w1 - 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 syrup = w3-w1/× Density of water

w2-w1

❖ Procedure for polyherbal syrup:

Collection of Herbal Plant:

Meshashringi leaves and Indian black jamun seeds are collected from our area in Tiruvallur, from Asia, Africa and Australia. Meshashringi leaves were dried for a week to remove moisture and jamun seeds were dried. It is also dried in the shade of the sun for 3 days, then the dried leaves and dried seeds are crushed and mashed with a mortar and pestle. The fine powder was sieved through a No. 2 sieve.

➢ Preparation of Polyherbal anti-diabetic herbal syrup(50ml):

- **Manufacturing Process:**

✓ **Step 1: Preparation of Decoction:**

Take 5 grams of Mashashringi leaf powder and 5 grams of black Indian jamun seed powder and mix in 500 ml of pure water. Boil the mixture until the volume reaches a quarter of the original volume and cool the boiled mixture and strain it through a filter paper. The filtrate from the boiling mixture is used to prepare the final polyherb syrup.

✓ **Step 2: Preparation of flavor solution:**

1.5 ml pepper oil in 2.5 ml propylene glycol was prepared separately.

✓ **Step 3: Preparation of simple syrup with sodium saccharin:**

Mix 3.3 grams of sodium saccharin with 10 ml of distilled water to make a thick solution and add to the mixing bowl.

✓ **Step 4: Preparation of polyherbal syrup:**

Remove the filter and add it to the mixing bowl containing the simple syrup and mix well, then add additives such as methylparaben (2.5 grams) and add the fragrance solution to the mixing bowl, then an erythrosine dye (0.1) add ml. Then, in the end, make the amount to 50 ml with the specified water

- ## Conclusion:

Herbal remedies are utilized by 50% of the global population, due to their enhanced acceptability and improved compatibility with humans. It has reduced side effects compared to synthetic alternatives. In this research, we formulated a polyherbal anti diabetic syrup utilizing a leaf extract of Meshashringi and a seed extract of Indian Black jamun; these two herbal substances exhibit a strong anti-diabetic effect as indicated by the literature review. The created syrup is subjected to different assessment criteria and it holds the value within the acceptable ranges. In vitro research for anti-diabetic effects has been conducted with the formulated Polyherbal syrup, it demonstrates a strong anti-diabetic effect. Currently, the rising need for herbal medicine has grown. Individuals might prefer to embrace herbal medicine because of its reduced side effects.

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