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Research Article

Development And Assessment of Poly Herbal Tablet for Antidiabetic Activity

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ARTICLE INFO	ABSTRACT
Published: 14 May 2025 Keywords: Herb Dad, Syzygium kreuzkumini, Trigonella Foenum-graceum, Gymnema Sylvester Anti- diabetic tablets. DOI: 10.5281/zenodo.15410928	The main goal of this project is to prepare and evaluate antidiabetic drugs based on drying, grinding and ethanol extraction using local excavation shower seeds, bone horn clover seeds, and gymnasium leaves. The above plants have good antidiabetic, antibacterial, antioxidant and anti-inflammatory properties. Tablets were manufactured according to a preliminary language study and measured based on body weight change, hardness, spring time, thickness, and decay time.

INTRODUCTION

Diabetes is a group of metabolic diseases characterized by long-term disease (changes) and hyperglycemia (hyperglycemia)[23]. Only half of those who are unaware of the illness receive appropriate treatment. This can be caused by insulin deficiency or insulin resistance, or both. Insulin secreted from beta cells in the pancreas regulates blood glucose. Acute hyperglycemia is associated with long-term damage, dysfunction and failure of many organs, especially the eyes, kidneys, blood vessels, heart and veins, and therefore involves many different organisms, It contains many phytochemicals such as various Proteins, calcium, carbohydrates, etc. [24]

Types of diabetes

Diabetes leads to impaired body capacity for food use, as the pancreas cannot use insulin or the body properly. Hypoglycemia (hypoglycemia) is most commonly observed in diabetics when the body contains too much insulin, too little food, delayed eating, or exceed normal movements. If your body contains too little insulin, too much food, or too

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little movement, this can lead to hyperglycemia. [18-19]

1. Type-I or Insulin Dependent Diabetes Mellitus (IDDM):

Juvenile diabetes is an immune-mediated disease, characterized by the destruction of pancreatic beta cells by T-cell-mediated immunity. This reduces the lifespan of the third pancreatic cells in tissues and fluids and pancreatic cells due to ketoacidosis.[22-23]

2. Type-II or Non-insulin Dependent Diabetes Mellitus (NIDDM)/:

Adult diabetes in adults is characterized by insufficient insulin secretion, along with response to increased blood glucose levels in NIDDM. Decreased insulin sensitivity is abnormal, and hyperglycemia can be reversed by insulin sensitizing agents or by reducing liver glucose.[22]

3.Gestational diabetes mellitus (GDM):

In pregnant women who are not diabetes, gestational diabetes appears almost at the end of the third month of pregnancy or at the beginning of the fourth month of pregnancy. This is characterized by carbohydrate resistance caused by hormonal changes caused by pregnancy that prevents the body from using insulin. Gestational diabetes affects 4% of pregnancy and disappears after birth.

Mechanism of Action of Herbal anti-diabetes:

The antidiabetic activity of plants is due to several mechanisms. The mechanisms of herbal antidiabetic drugs can be divided into:

- Adrenomimetics , pancreatic β-cell potassium channel blockade, cAMP (second messenger) stimulation.
- Inhibition of renal glucose reabsorption
- Stimulates pancreatic beta cells to secrete insulin or / and insulin
- Inhibits the degradation process
- Reduces insulin resistance
- Provides beta cells with important elements such as calcium, zinc, magnesium, manganese and Copper.
- Regenerates and / or repairs pancreatic cells beta cells
- Increases the size and composition of islet cells
- Promotes insulin secretion
- Promotes glycogenogenesis and glycolysis
- Anti-inflammatory effects Blocking islet cells destroys beta Cell
- Improves digestion and reduces blood sugar and area.[31-32]





Signs and symptoms : Symptoms of untreated diabetes include polyuria, excessive thirst and weight loss. There are also other signs and symptoms, such as fatigue, blurred vision, and genital irritation from candidiasis. Approximately half of those affected may be asymptomatic. Type 1 occurs immediately after the preclinical level, but Type 2 starts faster.

Advantages:

A) Herbs have a long history of use, tolerance and good acceptance.

B) Medicinal plants are the only hope for us to have cheaper food for the masses in the world.

C) Availability of medicinal plants is not a problem especially in developing countries like India with its agro-climatic, cultural and ethnobiological diversity.

D) Cultivation and processing of plants and herbs is environment-friendly.

E) Long-term and proven use of herbs shows them to be safe and effective.

F) All over the world, medicinal plants have provided many of the most powerful medicines for the vast arsenal of modern medicine, either in crude form or in the pure substances that make up modern medicine.

Diagnostic Methods of Diabetes:

Diabetes is diagnosed by one of the following:

Fasting blood glucose $\leq 7.0 \text{ mmol/L} (126 \text{ mg/dL})$

Plasma glucose $\leq 11.1 \text{ mmol/L} (200 \text{ mg/dL}) < \text{br>Glycated heme (Hb) A1C}) \leq 6.5\%$ Oral Glucose Tolerance Test (OGTT) People with sober blood sugar of 100-125 mg/dL have a disordered diabetes, also known as pre-diabetes. Hungry blanks are popular because they are cheap and easy to run. Diabetes should be confirmed on a second test on another day. HBA1C is an indicator of average blood glucose concentration over the past three months and is recommended as a useful test for the diagnosis of type -2 diabetes, as it overcomes many of the problems associated with OGTT [33-34]. The most frequently used anthropometric measurements to measure obesity are BMI (Body Mass Index), Toilet (Waist Size),



and WHR (Waist Hip Ratio). The criteria most frequently used to diagnose obesity are the National Cholesterol Education Program (NCEP) and ATP III standards. Regarding sensitivity, Pandya et al. [5] shows that toilets are a better indicator of diabetes than BMI.[18]

Ingredients:

Syzygium cumini

Trigonella foenum-graceum

Gymnema Sylvester

How They Acts

1.Jamun (Syzygium cumini):

The aim of this study was to isolate S. cumini [SC] seeds and demonstrate its anti-inflammatory properties. A compound called mycaminose was isolated from SC seed extract. Mycaminose (50 mg/kg) isolated from cumin seeds and the mixture extracted with ethyl acetate [EA] and methanol [ME] (200 and 400 mg/kg) were studied against streptozotocin (STZ) induced diabetes. Antidiabetic activity of streptozotocin (STZ) induced diabetes.



2.Fenugreek (Trigonella foenum-graceum): Anti-hyperglycemic effects associated with decreased somatostatin and increased plasma glucagon levels the anti-hyperglycemic effects of fenugreek are thought to be due to amino acids4-Hydroxysoleucine works by: Increasing insulin and glucose absorption in peripheral tissues.



3.Gurmar (Gymnema sylvestre): Aqueous extracts of G. sylvestre have been reported to cause a reversible increase in calcium and insulin secretion from beta cells in type 2 diabetic rats and humans. Regeneration of pancreatic cells voluntarily increases insulin levels.



Methods Of Preparation: -

Plant material collection and extraction: -

Material seeds Syzygium Cumini, Trigonella Foenum-graceum seeds, gym leaves. In this study, the regions were used in ethanol, dried, powdered and extracted. Powdered plant materials were extracted using a soxhlet extractor using a solvent, a soxhlet extractor, using ethanol using solvents, and extracts were stored for further use [17].



Excipients used to formulate tablets: -

In this expression, it is used for lactose, strength, acacia, magnesium stearate, methyl paraben, and propyl parabens used for the assembly of tablets.

Methyl cellulose and lactose, which are used as bulk sheets, acacia, and starch, are used as means of the use of granules, talc and stearate magnesium, used in lubricants and methyl paraben.[35-36]



Formulation of Polyherbal Anti-Diabetic Tablets:-In the Present study dried ethanolic extract of Syzygium cumini, Trigonella foenum-Graceum, Gymnema Sylvester was formulated into tablet dosage form by wet granulation method. Formulation has the following composition as depicted in the following Table 1.

Sr.no Ingredients Quantity			antity	
		F1	F2	F3
1	Syzygium	65	55.6	59
	cumini			
2	Trigonella	59	65	55.6
	foenum-			
	graceum			
3	Gymnema	55.6	59	65
	sylvestre			
4	Methyl	15	15	15
	cellulose			
5	Magnesium	5	5	5
	stearate			
6	Talc	100	100	100
7	Starch	5%	5%	5%
8	Lactose	100	100	100
9	Methyl paraben	0.4	0.4	0.4
10	Propyl paraben	0.1	0.1	0.1
11	Acacia	0.120	0.120	0.120
	Weight per	400	400	400
	tablet			

Preparation of granules by wet granulation method: -

O The strength was measured, processed into emulsions with preservatives, and cooked well in a water bath until a translucent semi-dyed mass formed.

O The Acacia binding solution was prepared by using required quantity of water Separately.

O A measured amount of auxiliary substance was mixed thoroughly with the extract, and the cooked thickness and acacia solution were added slowly, and slowly until the powder became a wet mass.

O This damp mass was passed through sieve number 16 and dried in an oven at a temperature of 105°C, until granules were dried properly. O Then the dried granules were passed through sieve number 20 and subjected to lubrication

O The aerosil and magnesium stearate were thoroughly mixed, sieved with a 40 sieve number and mixed with the dried granules. Finally, the tablet was compressed with punches using a single punching machine.[37]

- Evaluation Tests:[38]
- Pre formulation studies: -
- 1.Angle of repose
- 2. Bulk density
- 3. Tapped bulk density
- 4.compressibility index

• Physical evaluation tests -



1.colour and appearance

- 2. Weight variation
- 3.Hardness and friability
- 4. Thickness
- 5. Disintegration test

Pre formulation studies

Preformulation studies were performed before formulating the tablets powders were subjected to following Evaluation parameters.

Angle of repose: -

The stationary angle was determined using the funnel method. The accurately measured mix was

photographed with a funnel. The height of the funnel was positioned so that the tip of the funnel touches only the tip of the bunch or the mixing head. The drug was freely flowed to the surface by a funnel. The following table shows the relationship between gentle angle and powder flow. The diameter and stationary angle of the powder cone were calculated using the following equation:

Tan $\theta = h/r$

Where h = height of powder cone formed

 $\mathbf{R} =$ radius of the powder cone formed.

Relationship between angle of repose (θ) and powder flow.

Angle of repose (θ)	Type of flow
25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

Bulk density:-

By pouring the weighed quantity of blend into graduated cylinder and measuring the volume.

Bulk density = weight of powder / volume of packing

Tapped bulk density: -

The well-known mass of the drug aid mixture was placed in a step-by-step cylinder. The cylinders were attracted to the hard surface from a height of 10 cm at 10 cm intervals. The knock continued until no further changes in volume were found.

Tapped bulk density = Weight of the powder / Volume of the tapped packing

Compressibility index:-

The Compressibility index of the blends was determined by Carr's compressibility index. following table shows Grading of powders for their flow properties.



Compressibility = Tapped bulk density - loose bulk density/Tapped bulk density ×100 Index (%)

Carr's index	Flow	
5-15	Excellent	
12-16	Good	
18-21	Fair to passable	
23-35	Poor	
33-38	Very poor	
<40	Very very poor	

Physical evaluation of Tablets: -

Tablets were subjected to following evaluation parameters

Colour and appearance: -

For the colour and appearance the tablets were visually examined

Weight variation test:-

Variations were determined on average for 20 tablets. All tablets were individually inspected for weights. In any case, deviations were calculated from the average weight and expressed as percentages. Two of the sample size tablets are significantly biased from their average weight, and none of the tablets are more than doubled.

Hardness and Friability test:-

Hardness test and friability tests were performed for the tablets using calibrated Monsanto hardness tester And Roche friabilitor (4 min at 25 rpm) tests respectively.

Thickness:-

By using Vernier calipers was used to evaluate thickness of tablets. Thicknesses were evaluated.

Disintegration test for tablets: -

The glass, made with a length of plastic tube [80-100 mm], is a slice with a slice with an inner diameter [28 mm] and an outer diameter [30-31 mm] on the bottom, with a rust-free wire measuring device. Six tablets were placed in the tube, raised and lowered, and the entire up and down movement was repeated every minute. If there were no particles on top of the measuring device to easily run the network, the tablet dissolved.

RESULT: -

Formulations made according to the wet granulation method were tested for preenvironmental studies for the potential evaluation of tablet compression. All evaluated formation parameters are examined based on the powder flow properties of the preform. This process is then continued with compression of the tablets using the wet granule method after assessing the compressed tablets by the observed physical parameters.

Evaluation tests :-

Pre formulation tests:-



Sr. No	Parameter	F1	F2	F3
1	Angle Of Repose	30.76	32.85	31.85
2	Bulk density	0.45gm/cm3	0.47 gm/cm3	0.45 gm/cm3
3	Tapped Bulk Density	0.50 gm/cm3	0.51 gm/cm3	0.52 gm/cm3
4	Compressibility Index	11.1%	13.3%	12.6%

 Table 1: Preformulation Parameters for Herbal Anti Diabetic Tablets

Table 2: Physical parameters for herbal anti diabetic tablets after 1 month

		Batch No		
Sr. No	Parameter	Quantity Per Tablet(mg)		
		F1	F2	F3
1	Color	Creamish	Creamish	Creamish
2	Weight	6%	7.5%	5%
	Variation Test			
3	Friability	4.980	4.60	5.10
4	Hardness	3.30	4.4	4
5	Thickness	3.249 mm	3.501mm	3.723mm
6	Disintegration	4:15 min	4:32min	4:24 min

Table 3: Physical parameters for herbal anti diabetic tablets after 1 month

Sr. No	Parameter	F1 Formulation
1	Color	Creamish
2	Weight Variation	6%
3	Hardness (kg/cm²)	3.30
4	Friability (%)	4.980
5	Thickness (mm)	3.249mm
7	Disintegration(min)	4:15 min

[F1 is better formulation than F2 and F3 Formulation: Formulation of polyherbal antidiabetic tablet]





CONCLUSION:

This study found that physicochemical parameters such as herbal density, nipple density, CARS index, house ratio, and sensory properties can be used effectively in standardizing individual and constructed plant herbal formulations of plant antidiabetic drugs. The results of this study can be used as a reference when sample restrictions are used for antibiotic quality control and quality assurance.

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