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FORMULATION AND EVALUATION OF HERBAL TABLET FROM BUTEA MONOSPERMA

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ABSTRACT

The aim of the current study is to formulate herbal tablets containing Butea Monosperma flower powder by direct compression method by using suitable excipients. Butea Monosperma flower contain antidiarrheal, anthelmintic, anti-diabetic, anti-stress, hepatoprotective, antifungal, astringent, laxative and stomach pain relieving activity, etc activities. These flowers of Butea Monosperma are dried for 3-4 day under sun light and size is reduced by using mixer grinder and converted to coarse powder and passed through sieve no. #100, #80, #60, #44. This collected powder and various excipient are used for preparing tablets. These prepared tablets were evaluated by using different evaluation tests like hardness, thickness, friability, weight variation. The powder was free from all kind of microorganisms and antimicrobial activity performed showed that flowers of plant Butea Monosperma did not show antimicrobial activity against gram positive organism staphylococcus aureus and bacillus subtills and E coli.

Index Terms - Butea Monosperma, Palash, Abdominal pain, Staphylococcus Aureus, Digestive issue.

INTRODUCTION

Herbal medicine is study of Pharmacognosy and use of medicinal plants which is a basis of traditional medicine for prevention and treatment of disease. It contains numerous bioactive compounds possessing high medical significance. it is the oldest form of healthcare and also well accepted complementary and alternative drug. Medicinal plants are one of the most

accessible sources for treating diseases like gastrointestinal disorders due to its few side effects, less toxicity, affordability, cost effectiveness and better therapeutic effect good patient compliance and widespread availability. Herbal medicines are currently in demand and their popularity is increasing day by day. Objective of present investigation is focused to develop to the elegant, acceptable, stable oral herbal tablet to reduce stomach pain because stomach pain is one of the most important pains that all people have experienced during their lives at least once. Due to adverse effects of chemical based remedies and high cost of medicine the search for the alternative products still continues and herbal formulations proves to be good alternative.[1]

Butea Monosperma (Lam.), popularly known as 'Flame of the forest' or 'Palash' or 'Gul-e-tesu', a member of Fabaceae family, is a commonly grown tree in Indian subcontinent along Indo-Gangetic plains. For centuries products derived from different parts of the Butea Monosperma (Lam.) including bark, leaves and flowers have been widely used for the treatment of several human ailments in the traditional Ayurvedic/Unani Indian medicine system. The flowers of Butea Monosperma (Lam) (Family: Fabaceae) have been traditionally used in India for the treatment of a variety of ailments including liver disorders, microbial and parasitic infections, stress, diarrhea, diuresis, arthritis and sexual disorders, inflammation and diabetes.[2]

The main chemical constituents of B. Monosperma flowers include butin, butein and butrin. Isobutrin, palasitrin, coreopsin, isocoreopsin, chalcones and aurones are also present in the flower extracts. While butrin and isobutrin are considered to be the hepatoprotective principles of B. Monosperma flowers, butein is reported to confer protection against phorbol ester-induced skin cancer and carbon tetrachloride-induced liver fibrosis. Besides, butein shows an anti-proliferative effect on a wide range of human tumor cells including breast carcinoma, colon carcinoma, lymphoma, acute myelogenous leukemia, melanoma and hepatic stellate cells. The antiproliferative activity of butein apparently relates to its inhibitory action against various signaling pathways, like mitogen activated protein kinases, signal transducer and activator of transcription and protein tyrosine kinases. Butein also exhibits antioxidant property against lipid and of low-density lipoprotein peroxidation. More recently, we and others have shown the chemo preventive effects of the aqueous and methanolic extracts of B.Monosperma in rodent models of hepatic injury and hepatocellular carcinoma. Further, oral administration of the flower powder is also reported to confer

protection against paracetamol-induced liver damage in rabbits. In the present study, we have evaluated the protective efficacies of butein, butrin, combination of butein and butrin and extracts of the flowers of B. Monosperma in five different solvents against free radical accumulation, apoptotic cell death and oxidative stress in liver cells. This study was carried out to evaluate the synergistic effects of two active constituents of B. Monosperma flowers and compare it with its crude aqueous and alcoholic extracts.[3]

PLANT PROFILE

Butea Monosperma

Synonym: Palash, Flame of the forest.

Biological Source: It consists of dried fruit, flowers, leaves of butea Monosperma.

Family: Fabaceae.

Chemical Constituents: Alkaloids, flavonoids, phenolic compounds, amino acids, glycosides, resins, saponin, steroids.

Fig. No. 2: (Flower).

Fig. No. 3: (Butea Monosperma Flowering Tree).

Kingdom: Plantae

Subkingdom: Tracheobionta

Division: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Fabales

Genus: Butea

Species: B. Monosperma

Description Morphology

It is an erect, medium sized dry seasontree, growing to 15m tall. It is a not so fast growing tree, young trees have a growth rate of a few feet per year. The leaves with an 8 to 16cm petiole and three leaflets. The flowers are basically 2.5 cm long, color of orange-red, and developed inracemes up to 15 cm in length. The fruit is a pod of 15–20 cm long and 4–5 cm broad. The bark is ash colour.

Leaves: They have3 foliage, large and stipulate, 10-15 cm long petals. Leafs are dull, having no hair above, finelyand conspicuously criss-cross veined beneath with base.

Flowers: They start appearing in the month of Feb and hold on up to the last Week of April. The size is nearly 2 cm to 4 cm in diameter. These go to be densely crowded on leafless branching. Flowers are 14 cm long.

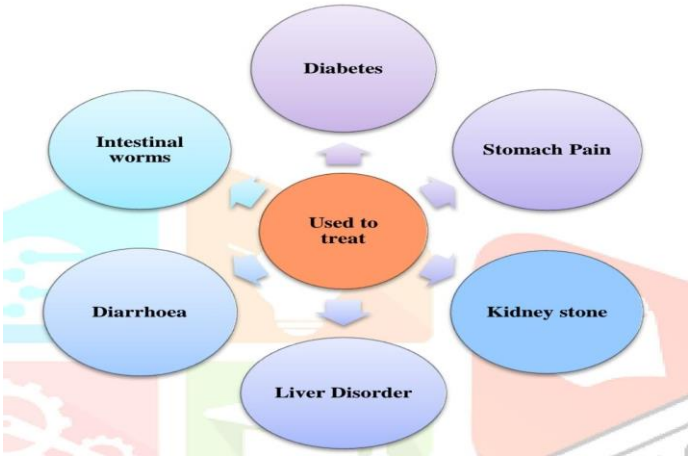
Calyx: The lower most part of the flower called the calyx and which is dark gray in color. Which works as a supporting branch and the upper foremost part are of brick red color.

Pods: Coming to the pods the dimension are 12-20 cm by 2.7-6 cm, which becomes thick at the sutures area.

Seed: The size of the seeds range from 24 mm to 45 mm long, 25.7 mm to 25.4 mm wide and 1 mm to 2 mm thick. The color of seed coat is brown. The hilum is present at the middle part of the bulb edge of the seed.

Fruit: The leguminous property of palash comes with there fruit.[4]

Uses of B.Monosperma



Abdominal pain

Abdominal pain refers to discomfort or other uncomfortable sensations that you feel in your belly area. Just about everybody, at one time or another, will get a bellyache. Most causes of abdominal pain aren't reasons to worry, and your doctor can easily diagnose and treat the problem. But sometimes, it can be a sign of a serious illness that needs medical attention. Abdominal pain can develop for many different reasons. Most of the time, it's not serious and will go away on its own. But persistent, severe, and unexplained abdominal pain could be a cause for concern and require treatment.

Types of Abdominal Pain

There are several types of abdominal pain, based on how quickly your pain starts and how long it lasts:

Acute: Acute abdominal pain starts over a few hours or days and may come with other symptoms. It's pretty common and rarely much of a concern. It could be gas, for example. But if you have severe pain that comes on suddenly, you're more likely to have something more serious that might require a trip to the emergency room, such as appendicitis.

Chronic: This type of pain lasts 3 months or more and may come and go. Chronic abdominal pain may occur along with other symptoms. What those symptoms might be depends on the cause of the pain. If you have an inflammatory bowel disease such as Crohn's disease, you might have chronic diarrhea in addition to abdominal pain.

The most common causes of abdominal pain can be grouped into categories. These are:

Pain caused by digestive issues

1. Indigestion
2. Gas pain
3. Constipation
4. Diarrhea
5. Certain food allergies and sensitivities
6. Food poisoning

Pain caused by inflammation due to

1. Stomach flu, or viral gastroenteritis.
2. Peptic ulcer disease.
3. Gastroesophageal reflux disease (GERD), also called chronic acid reflux.
4. Urinary tract infection (UTI).

Reproductive pain in people with a uterus

1. Menstrual cramps.
2. Pain due to ovulation.

Less common but more serious causes of abdominal pain include

1. Appendicitis
2. Diverticulitis
3. Gallstones
4. Gallbladder inflammation, called cholecystitis
5. Hepatitis, including alcoholic hepatitis, toxic hepatitis, viral hepatitis, metabolic hepatitis, and autoimmune hepatitis
6. Certain types of cancer, including stomach, gallbladder, pancreatic, colon, ovarian, uterine, and liver cancer.
7. Bile duct issues, such as cancer, stones, and strictures.
8. Kidney stones.

Fig. No. 3.

Pain in the Stomach

Any pain from a tubular or hollow structure like the stomach typically comes and goes in pulses. It's often referred to as a colicky type of pain.

Pain in the Intestines

Pain in the intestines is again often colicky and can vary greatly in severity. It may be related to food, but only sometimes, and it's often accompanied by feeling bloated or full.

Pain in the Bowel: the most common cause of bowel-related pain is constipation.

Pain in the Gall bladder: Pain in the gallbladder is often felt in the right upper quadrant and is colicky. It typically comes on after eating foods high in fat.[5]

MATERIALS AND METHODS

Procurement and Authentication of Sample

Collect the flowers of Butea Monosperma plant and mount on herbarium sheet as per procedure of botanical survey of India for Identification and Authentication of plant. After identification the collected flowers were dry in shaded place at room temperature and grind as coarse powder using mechanical grinder. This powder was further used for preparation of tablet.

Pre formulation Studies

1. General Appearance

Physical examination like colour, odour, taste was done by organoleptic inspection.

2. Angle of Repose

(a) Angle of repose was measured by fixed funnel method. The fixed funnel method uses a funnel being secured with its tip at a given height h above the graph paper which was placed on a flat horizontal surface, granules were carefully transferred through the funnel until the apex of the conical pile touching the tip of the funnel.

(b) Tan θ = h/r

(c) Where θangle of repose

(i) r = radius of the base of conical pile and

(ii) h = height of pile

3. Bulk density

(a**)** The bulk density is defined as the ratio of bulk mass of the granule to the bulk volume. And it is denoted by pb.

(b) Bulk density (pb) = M/Vb

(c) Where M = mass of the sample, Vb = bulk volume

4. Tapped Density

(a) The tapped density is defined as the ratio of the weight of powder to the minimum volume occupied into the measuring cylinder. It is determined by placing a graduated cylinder containing a known mass of drug or formulation on a mechanical tapper apparatus which is being operated at fixed no. of taps until the powder bed reached to a minimum volume.

(b) Tapped density (pt) = M/Vt

(c) Where, M= weight of powder blend, Vt= tapped volume**.**

5. Carr's Index

Based upon the apparent bulk density and tapped density, the percent compressibility of the powder mixture was determined by the given formula.

Carr's index = Tapped density – Bulk density/ Tapped density x 100

6. Hausner's ratio

It is and indirect index of ease of measuring of powder flow with lower Hausner's ratio (≤ 1.25) indicating better flow properties than higher ones (≥ 1.25)

Hausner's ratio = Tapped density/ bulk density

Preparation of tablets using Butea Monosperma flower by direct compression method

The tablets of Butea Monosperma will be prepare by direct compression method. The Table No: 01 given below shows the composition of each tablet formulation. Mixing of powders was carried out using a pestle and mortar. Finally, 500 mg of each mixture was weighed and fed manually into the die of a single punch tablet machine.

Table No. 1: Formulation of tablet.

Ingredients (mg)	Formulation code			
	B1	B2	B3	B4
Drug	100	120	140	150
Lactose	350	330	300	300
Starch	40	40	50	40
Talcum Powder	03	03	03	03
Colouring Agent	07	07	07	07
Total Weight (mg)	500	500	500	500

Evaluation of prepared tablets

All the formulated tablets will be subjected to following evaluation parameters.

1) Thickness and diameter

Thickness and diameter of ten tablets selected from each batch were measured using Vernier Caliper. The extent to which the thickness of each tablet deviated from ± 5% of the standard value was determined.

2) Weight variation

20 tablets were randomly checked to ensure that uniform weight tablets were being formed. Tablets were weighed individually and average weight and % weight variation was calculated.

Weight Variation = Average weight – Initial weight / Average weight

3) Hardness

Hardness (Crushing strength): The crushing strengths of tablets were determined individually with the Monsanto hardness tester, following 10 tablets of each batch were used and the mean crushing strength was calculated.

4) Friability

The friability of 20 tablets was determined using Roche Friabilator. This device subjects the tablets to the combined effect of abrasions and shock in a plastic chamber revolving at 25 rpm and dropping the tablets at a higher of 6 inches in each revolution for 4 min. Pre weighed sample of tablets was placed in the friabilator and were subjected to 100 revolutions. Tablets were dedusted using a soft muslin cloth and reweighed.

% Friability weight = initial weight − final weight / initial weight × 100

5) Disintegration test

It is the time required for the tablet break into particles. Disintegration is to be performed to determine whether tablets disintegrate within the prescribed time when placed in a liquid medium at the experimental conditions. Generally, the test is carried out once. In case at the end of the time limit if 1 or 2 tablets fail to disintegrate completely, repeat the test on 12 additional tablets. The requirement is met if not less than 16 of the totals of 18 tablets tested are disintegrated.

RESULT AND DISCUSSION

Identification and Authentication of The Plant

The flowers of Butea Monosperma plant were collected and mounted on herbarium sheet as per procedure of botanical survey of India for Identification and Authentication of plant from

Dr. Vishal R. Marathe, Assistant Professor NES Science college, Nanded. After identification the collected flowers were dried in shaded place at room temperature and grinded as coarse powder using mechanical grinder. This powder was further used for preparation of tablets.

Fig. No. 4: (collected and dried the flower powder).

Fig. No. 5: (Grinded as coarse powder).

Pre formulation Studies

Flow properties of the dried powder values such as bulk density and tapped density was found to be 0.166 To 0.217 g/ml and 0.5 to 0.33 g/ml respectively and angle of repose was found to be 37°8′ to 39°8′. Carr's index was found to be in range of 33.6 to 66.8 %, Hausner's ratio was found to be 1.50 to 1.52.

Table No. 02: Pre-formulation Study.

Batch Code	Sample (A)	Sample (B)	Sample (C)	Sample (D)
Colour	Yellow	Yellow	Yellow	Yellow
Odour	Faint	Faint	Faint	Faint
Taste	Slightly acid & bitter	Slightly acid & bitter	Slightly acid & bitter	Slightly acid & bitter
Angle of repose (θ)	39°1′	38°	37°8′	39°8′
Bulk Density(gm/ml)	0.217	0.166	0.166	0.166
Tapped Density(gm/ml)	0.33	0.5	0.25	0.25
Carr's Index (%)	52	66.8	33.6	33.6
Hausner's ratio	1.52	1.52	1.50	1.50

Table No. 03: Solubility Test according to sieve number.

Test	#100	#80	#60	#44
H_2O	Slightly soluble	Poorly soluble	Insoluble	Insoluble
NH_3	Slightly soluble	Poorly soluble	Insoluble	Insoluble
N_aOH	Sparingly soluble	Slightly soluble	Insoluble	Insoluble

Evaluation tests

The tablet parameters observed are given in table below. The tablets were compressed at the specified weight (500mg). The maximum weight variation of the tablets was ± 0.498%, which falls within the acceptable weight variation range of ± 5%, hence the tablets of all batch passed the weight variation test. Hardness for tablets of all batches was in the range of 4.025 to 5.85kg/cm², which falls above the limit of not less than 3.0 kg/cm². Friability value for tablets of none of the batch was more than 0.87%. The thickness of the tablets of all the batches was found in the range of 3.4 - 3.6mm² indicating fairly acceptable tablets.

Disintegration time of the tablets of all batches was found in the range of 3 min to 6 min indicating acceptable tablets. (Uncoated USP tablets have disintegration time as low as 5 minutes, but the majority have max.)

Table No. 4: Evaluation of all prepared batches of Tablet.

Batch code	Hardness (Kg/cm2)	Thickness (mm2)	Weight variation (mg)	Friability (%)	Disintegration time
B1	5.85	3.66	0.495 ± 05	0.32	6 min
B2	4.45	3.40	0.453 ± 05	0.26	4 min
B3	4.025	3.42	0.462± 05	0.24	3 min
B4	5	3.55	0.498 ± 05	0.29	5.5 min

SUMMARY AND CONCLUSION

Summary

In present research work flowers were collected, powdered and characterized. After pre formulation study it was used as therapeutic agent for preparing formulation. Tablets were formulated using single punch tablet punching machine. From the above evaluation study, the results of B2 and B3 are almost same and in an expected range but the friability and disintegration test of B3 shows the better result over the batch of B2. From present study it is concluded that herbal tablets of B. Monosperma may be an ideal dosage form for effective management of stomach pain.

CONCLUSION

Based on the research findings, the following conclusions can be drawn regarding the formulation of herbal tablets from Butea Monosperma:

Dosage Form: Medicated herbal tablets using Butea Monosperma flower powder are considered an ideal dosage form for the effective management of stomach pain.

Optimal Formulation: Among the various batches tested, Batch B3 was identified as the optimized formulation because it provided the best results in friability and disintegration tests.

Therapeutic Potential: The study supports the use of these findings to design stable, elegant, and affordable herbal alternatives to chemical-based remedies for gastrointestinal issues.

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