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Research Article

Formulation and Evaluation of *Salix alba* Herbs Tablet for Post-Covid complication related to blood clots

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Abstract

Herbal formulations have growing demand in the world market. The present study was designed as formulation and evaluation of *salix alba* herbal tablet prepared. Tablet was prepared by direct compression method. The present communication also deals with the evaluation of formulated tablets (weight variation, friability, hardness and disintegration time.*Salix alba* contains a substance (salicine) that is converted by the body into a salicylate similar to the blood-thinner aspirin. *Salix alba* have anti-thrombotic action which can be use in Post Covid complication related to blood clot in place of aspirin.

Keyword : *salix alba* , Tablet, salicine Post Covid conditions , evaluation, friability.

Introduction : Medicinal plants contain inherent active ingredients to cure disease or relieve pain. The use of traditional medicines and medicinal plant in most developing countries as therapeutic agent for the maintenance of good health has been widely observed.

Salix alba, the Willow bark, also known as white willow bark, brittle willow, and simply willow, is a dietary supplement from the Salicaceae family. Like all willows, *Salix alba* is usually to be found in wet or poorly-drained soil at the edge of pools, lakes or rivers. Its wide-spreading roots take up moisture from a large surrounding area It is most often used by patients to treat headache or pain caused by osteoarthritis, myalgia, gout, and dysmenorrhea. Although components of willow bark include flavonoids and tannins, its pain-relieving properties are attributed to the salicin glycosides present in the compound. After ingestion of willow bark, the salicin glycosides are converted in the intestine to saligenin, which is then metabolized to produce salicylic acid. At this point, elimination becomes the same as for aspirin (acetylsalicylic acid). As with aspirin, willow bark demonstrates analgesic, antipyretic, and antiinflammatory properties. Platelet aggregation may be inhibited by willow bark, but to a lesser extent than by aspirin.

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Studies comparing willow bark, diclofenac, and placebo in patients with osteoarthritis and rheumatoid arthritis found willow bark to be no better than placebo for pain relief. Although no studies have evaluated willow bark use for CTS, this substance can be regarded as having efficacy similar to that of aspirin and other NSAIDs in pain management.

white willow bark is similar to that of aspirin, which is a nonselective inhibitor of COX-1 and COX-2, used to block inflammatory prostaglandins. Salicin from white willow bark is converted to salicylic acid by the liver and considered to have fewer side effects than aspirin[1-2]

Materials and Methods[3-6]

Preparation of plant powder

The plant was dried under shade and then powdered coarsely with a mechanical grinder. The powder was passed through sieve No. 40 and stored in an airtight container for further use.

Preparation of extracts:

200 gm of coarsely powdered of bark of plant subjected to extraction with petroleum ether (60-80°C) in a soxhlet apparatus for de-fatting. The extraction was continued till the defatting of the material had taken place. This powdered defatted material of the drugs was subjected to extraction with methanol and ethanol in a soxhlet apparatus. Twelve cycles were done. The solvent was removed by evaporation at room temperature.

Phytochemical Tests

The extracts obtained by solvent extraction were subjected to various qualitative tests to detect the presence of plant constituents. The ethanol and methanol extracts were subjected to various qualitative tests to detect the presence of plant constituents. The results have been shown in table.

Preparation of Test Solution

The test solution was prepared by taking 1 g of the extract in 25 ml of water.

A. Test for Alkaloids

a) **Dragendorff's Test**: Few mg of extract of the drug dissolved in 5 ml of water added 2 M hydrochloric acid until an acid reaction occurred; 1 ml of dragendorff's reagent (potassium bismuth iodide solution) was added an orange red precipitate indicated the presence of alkaloids.

b) **Mayer's Test**: Two ml of extract solution was treated with 2 - 3 drops of Mayer's reagent was added (potassium mercuric iodide solution) formation of dull white precipitate indicated the presence of alkaloid.

B. Test for Tannins/Phenols

a) **Ferric Chloride test:** To the sample of the extract, 3-4 drop of ferric chloride solution was added appearance of dark blue or greenish black colour indicated the presence of phenols.

b) **Lead acetate test:** To the sample of extract, 10 % lead acetate solution was added, white precipitate was produced.

C. Test for Flavonoids

a) **Shinoda test**: In the test tube containing alcoholic extract of the drug added 5 - 10 drops of dil. hydrochloric acid followed by the small piece of magnesium. In presence of flavonoids a pink, reddish pink or brown color was produced.

D. Test of Saponins

Foam test: 1 ml of ethanolic extract was diluted with 20 ml distilled water and shaken in graduated cylinder for 15 minutes. One cm layer of foam indicated the presence of saponins

E. Test for Carbohydrates / Reducing Sugar

Following tests were carried out for carbohydrates.

Benedict's test: In a test tube containing extract of drug add benedict's solution, mix well, boiled the mixture vigorously for two minutes and then cooled. Formation of red precipitate due to presence of reducing sugar.

F.Test for Steroids and terepenoid

a) **Liebermann's Burchard reaction**: The test extract solution was dissolved in 2 ml of chloroform in a dry test tube. Now 10 drops of acetic anhydride and 2 drops of concentrated sulphuric acid were added. The solution became red, then blue and finally bluish green in color.

b) **Salkowsky test**: The extract of test solution dissolved in chloroform and equal volume of conc. sulphuric acid was added. Bluish red cherry, red and purple color was noted in chloroform layer, whereas acid assumes marked green fluorescence.

Polyherbal Tablet Formulation[8-15]

Formulation of Herbal Tablet

Tablets using extracts as active ingredients were prepared by dry granulation method. The dried powder extract and other ingredients were mixed uniformly and then the mixture was blended and granulated. The granules were compressed into tablets in an 8-station machine.

Table No. 1: Formulation of Herbal Tablet

Ingredient	Quantity Per Tablet(mg)
Salix albaet plant extract (Methanolic extract)	200
Superdisintegrants (CP and FSM in 1:1 ratio)	10
Talc	50
Mannitol	10
Aerosil	28
Magnesium Stearate	2.0

CP – Crospovidone, FSM : feugreek seed mucilage

Evaluation of Polyhedral Tablet [15]

Organoleptic Properties

Shape, color and taste were determined.

Weight Variation

The USP weight variation test is run by weighing 20 tablets individually, calculating the average weight and comparing the individual tablet weights to the average. The tablets meet the USP test if no more than 2 tablets are outside the percentage limit and if no tablet differs by more than 2 times the percentage limit. The weight variation tolerances for uncoated tablets differ depending on average tablet weight (**Table no. 2**).

For weight variation twenty tablets were weighed individually and calculated for average weight of tablet, the average weight was compared with individual tablet weight and % weight variation was determined by using following formula.

$$\% W = \{(W_o - W) / W_o\} \times 100$$

Where,

% W = Weight variation in percentage

W_o = Average weight of tablet

W = Individual weight of tablet

Table No. 2: Weight Variation Tolerances for Uncoated Tablets

Average Weight of Tablets (mg)	Maximum Percentage Difference Allowed
130 mg or less	10 %
130 mg to 324 mg	7.5 %
More than 324 mg	5 %

Hardness

The resistance of tablet to chipping, abrasion or breakage under conditions of storage, transportation and handling before usage depends on its hardness. Several devices are used to test tablet hardness: the Monsanto tester, the Strong-Cobb tester, the Pfizer tester, the Erweka tester and the Schleuniger tester. The force is measured in kilograms and when used in production, a hardness of 4 Kg/cm^2 is considered minimum for a satisfactory tablet.

Hardness of tablet was determined by using Monsanto tablet hardness tester.

Tablet Friability

A tablet friability measurement is made by use of the Roche friabilator. This device, subjects a number of tablets to the combined effects of abrasion and shock by utilizing a plastic chamber that revolves at 25 rpm, dropping the tablets a distance of six inches with each revolution.

Roche friabilator was used for the determination of friability. Pre-weighed 6 tablets were placed in the friabilator, which was then operated for 100 revolutions. Tablets were dusted and reweighed. The percent friability was measured using the formula;

$$\% F = \{(W_0 - W) / W_0\} \times 100$$

Where,

% F = Friability in percent

W_o = Initial weight of tablet

W = Weight of tablet after test

Disintegration Time

One tablet was placed in each of six tubes of DT apparatus. Disintegration test was performed at 37 ± 2^0 C. Disintegration time defined as time required to disintegrate and pass all fragments through the sieve (# 10)

Result and Discussion

Results of Organoleptic Evaluation

Organoleptic evaluation can be done by means of organ of sense which includes the below parameters and thereby define some specific characteristics of the material which can be considered as a first step towards establishment of identity and degree of purity. The organoleptic investigations (color, odour and taste) were performed.

From the results obtained in table no.3 it is clear that the *Salix alba* bark shows the brown colour, aromatic or characteristic odour,

Results of phytochemical Evaluation

A small portion of the dried extracts were subjected to the phytochemical test using (**Kadam *et al*., 2013)** methods to test for reducing sugar, alkaloids, steroid, tannins/phenols, saponins, flavonoids. Small amount of each extract is suitably centrifuged into the sterile distilled water to make the concentration of 1 mg per ml. The outcomes of the results are discussed in the table no-4

From the results obtained it is clear that the *Salix alba* methanolic extract shows the presence of alkaloid, steroid,phenols and flavonoids.

Evaluation of developed herbal formulation (tablet) organoleptic properties

The prepared herbal tablets were evaluated for their organoleptic properties and the results were shown in Table no. 5

Weight Variation

Twenty tablets were selected randomly and evaluated for weight variation and the results were shown in Table no.6

Hardness

The tablets were prepared by applying maximum force of compression and the average hardness of the tablet was found to be in the range of 3.5 to 4.5 kg/cm^2. Table no. 6.

Friability

Six tablets were randomly selected and evaluated for friability.

Disintegration Time

Disintegration test was performed at 37 ± 2^0C in DT apparatus and the average disintegration time of the tablet was found to be 16 min.

Table No. 3: Organoleptic Characters of Chosen Drugs

Drug	Color	Odour	Taste
Salix alba Bark	Dark brown	Characteristic	Bitter

Table No. 5: Organoleptic Properties of Developed Herbal Formulation

Organoleptic Parameter	Results
Shape	Round
Color	Light Brown
Taste	Characteristics

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Table No. 4: Phytochemical Evaluation of *salix alba* plantextracts

S.No	Phytochemicals	Methanol	Ethanol
1	Alkaloids	+	–
2	Flavonoids	+	+
3	Saponins	–	–
4	Tannins	+	+
5	Reducing Sugar	+	+
6	steroids	-	-

(+) Indicates 'Presence'; (-) Indicates 'Absence of the Phytochemical

Table No. 6 : Characteristics of Developed Herbal formulation

S. No.	Evaluation Parameters	Results	Remark
1.	Weight variation	None of the tablets out of the limit	Within Limit
2.	Average hardness	3.75 kg/cm^2	-
3.	Average % friability	0.56	Within Limit
4.	Average disintegration Time	15 min.	-
5.	Friability	0.705%	Pass