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PHARMACOGNOSTICAL, PRELIMINARY PHYTOCHEMICAL, FORMULATION AND EVALUATION OF ABUTILON CRISPUM OINTMENT

Dr. R. Thiruvenkatasubramaniam*, S. Vinoth Kumar, M. Visan, M. Yogesh and Dr. Sangameswaran

SSM College of Pharmacy, The Tamilnadu Dr. M.G.R. Medical University, Jambai, Erode.

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Corresponding Author: Dr. R. Thiruvenkatasubramaniam
SSM College of Pharmacy, The Tamilnadu Dr. M.G.R. Medical University, Jambai, Erode.
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ABSTRACT

In the areas where modern medicine is available, there is an increasing use and interest in history medicine recently observed. The rising applications of herbal medicines and other plant-based products stem from the fact that these plants are valued as a primary source of bioactive materials used in modern medicine. The main objective of this research is pharmacognostic, preliminary phytochemical analysis, formulate and evaluate a herbal formulation with the ointment dosage form containing *Abutilon crispum* (Herissantia crispa) extract. The ethanolic extracts were prepared using the maceration technique. The ointment base was synthesized and then the herbal ointment was prepared by adding the extract into the base using the levigation technique. After formulation, the ointment was evaluated for various physical and chemical properties including color, odor, pH, spreadability, consistency, solubility, and washability. Hence, this formulation could serve as an herbal escape to avail the medicinal properties of Abutilon crispum.

KEYWORDS: Abutilon crispum, anti-inflammatory effect, Maceration, Levigation, Spreadability.

I. INTRODUCTION

Herbal medicine is the oldest type of healthcare known to mankind. Herbs have been employed by every society throughout history. It was an essential component of the evolution of modern civilization.[1] In current days herbal ointment is more popular formulation use for external application. The conveying of drugs through the skin are encouraging concept because easy of access, large surface area, vast exposure to the circulatory and lymphatic networks and protective nature of the treatment.[2] Instead of the alternative formulation like herbal medicine may also be prepared in the form of ointment. These ointment mention a viscous semisolid preparation applied externally on body surfaces area such as the skin, mucus membranes of the eye, vagina, anus, and nose etc. These ointments have

medical properties. The medicated ointments contain a medicinal ingredient mixed, suspended or emulsified in the ointment base. Herbal ointment applied externally such as antipruritic, keratolytics, protectants, antiseptics, emollients and astringents. Ointment bases are mainly free from water and generally contain one or more chemical in suspension or solution or dispersion form. Hence Ointment bases may be different types like absorption bases, dehydrating hydrocarbon water soluble type.[3] Herbal plants have ability for the formation of secondary metabolites such as steroids, phenolic substances, flavonoids, alkaloids, etc. These secondary metabolites are used to treatment of many diseases.[4] *Abutilon crispum* (Linn) belonging to family Malvaceae is trailing perennial, weak, shrub, The plant common distribution in the shady forest undergrowth on hilly slopes. Found in throughout India, It is known as Nelabenda in local area.[5] The plant finds its application in the traditional system of medicine. In India the Plant is used in the treatment of asthma, piles, ulcers, cough, jaundice and diabetics by tribal people of Andhra Pradesh and fruits are used in the treatment of piles in Tamilnadu.[6] One of the studies found that *Abutilon crispum* L. Medik can be used as an anti-inflammatory agent through *in vivo* experiments, but the exact mechanism remains unknown.[7]

II. PLANT PROFILE

SCIENTIFIC CLASSIFICATION OF *ABUTILON CRISPUM*

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Eudicots

Clade: Rosids

Order: Malvales

Family: Malvaceae

Genus: Herissantia

Species: H. crispa

Binomial name: Herissantia crispa (L.)

Brizicky Synonyms: Abutilon crispum, Gayoides crispum

Abutilon crispum(Linn) belonging to family **Malvaceae** is trailing perennial, weak, sub shrub the stems flexuous, stellate-pubescent.

Leaves are ovate or cordate, crenate, up to 7-3x 2-3.5cm, acute, tomentose, lowers: 0.5-cm across, pale yellow, jointed above the middle. Calyxes 4-7 mm long.

Leaves of Abutilon crispum

Fruits are schizocarp, globose, bladdery, wrinkled, hirsute, 1.5-2cm across. **Seeds** reniform, blackish-brown.

Fruit of Abutilon crispum.

III. MATERIALS AND METHODS

1. IDENTIFICATION, COLLECTION AND AUTHENTICATION OF THE SELECTED PLANT

The plant material was authenticated by **Dr. P. RADHA Reasearch Officer (botany) Sci II & *Vc*; Siddha Medicinal Plants Garden/Mettur Dam, Tamilnadu – 636401.**

Authentication Number: **H291124203C**

2. PROCUREMENT OF PLANT MATERIALS

For the present investigation, Abutilon crispum plants were collected from **EDAPPADI**. Fresh leaves were washed with water and dried at room temperature, powdered with laboratory mixer, sieved and further studies were performed.

3. PHARMACOGNOSTIC EVALUATION

Pharmacognosy is the study of drugs of natural origin. In this study, the selected plant, abutilon crispum leaves, were evaluated microscopically and macroscopically using standard methodologies.

MORPHOLOGICAL EVALUATION

It involves to evaluation of drugs based on their colour, odour, taste, size, shape, and specific characteristics such as touch and texture. It is a technique evaluation based on the analysis of the morphological and sensory characteristics of entire medications. It contains conclusions derived from experiments involving sensations on sensory organs. The colour, odour, and taste of abutilon crispum leaf powder were investigated in this study.

MICROSCOPIC EVALUATION

Microscopic examination is necessary for powdered crude drugs. Crude drug powders are made up of cell fragments arranged into recognizable tissues. Surface constant analysis is another significant part of microscopically examination. The leaf constants were investigated using a camera Lucida. These constants have diagnostic relevance and are used to authenticate leaf medicines or detect adulterants. It enables a more thorough analysis of a substance and can be used to identify organized drugs based on their recognized histological characteristics. It is mostly employed for the qualitative

evolution of organized crude drugs in both whole and powdered forms. It also includes the examination of the ingredients using chemical methods on small amounts of powdered medications or histological sections of drugs.

1. T.s. of leaf

The Transverse section (T.S.) of a leaf is a cross-section that's created by cutting a leaf horizontally in the middle of the lamina, perpendicular to its longitudinal axis. This cut separates the leaf into two halves, top and bottom. The T.S. of a leaf includes the following parts:

➢**Epidemis**: Both the upper and lower sides of the leaf are covered by the epidermis, which is multiseriate and about three cells deep. The lower epidermis has stomata.

➢**Mesophyll**: The T.S. of a leaf also included a dorsiventral mesophyll.

➢**Veins**: The veins are made up of xylem and phloem.

2. *Stomatal number and stomatal index*

Stoma (plural-stomata) is a minute epidermal opening covered by two kidney shaped guard cells in dicot leaves. These guard cells, in turn, are surrounded by epidermal (subsidiary) cells. Stomata perform the functions of gaseous exchange and transpiration in plants. The nature of the stomata, as well as, the stomatal index and stomatal number are important diagnostic characteristics of dicot leaves.

Stomatal Number is defined as the average number of stomata per sq mm of epidermis of the leaf. The actual number of stomata per sq mm may vary for the leaves of the same plant grown in different environment or under different climatic conditions. It is, however shown that the ratio of the number of stomata to the total number of epidermal cells in a given area of epidermis is fairly constant for any age of the plant and under different climatic conditions.

Stomatal Index (S.L.) is the percentage which the number of stomata form to the total number of epidermal cells, each stoma being counted as one cell. Stomatal index can be calculated by using the following equation:

$$\text{Stomatal index} = S \times 100 / E+S$$

Where,

S=Number of stomata per unit area

E-Number of epidermal cells in the same unit area.

Whilst stomatal number varies considerably with the age of the leaf and due to changes in environmental conditions, stomatal index is relatively constant and therefore, of diagnostic significance for a given species. It is employed for the differentiation of allied or closely related to species of same genus in air dried, as well as fresh conditions.

Requirements

Compound microscope, stage micrometer, Camera lucida, Drawing board, Chloral hydrate solution, glycerine water, Micro slides, Cover glasses, Forceps, Small watch glass, Blade, Black colour Drawing sheet and White Marking pencil.

Procedure

1. Clear the fragments of leaf from the middle of lamina by boiling with chloral hydrate solution or alternatively with chlorinated soda. Peel out upper and lower epidermis separately by means of forceps.
2. Prepare the mounts of low and upper epidermis separately in glycerin water.

3. Draw a square of known dimensions by means of a stage micrometer and camera lucida on a drawing paper.
4. Replace the stage micrometer by the cleared leaf preparation, focus under the same magnification and trace the epidermal cells and stomata by looking through the microscope when a superimposed image of the leaf is seen at the same time. Count the number of epidermal cells and stomata (the two guard cells and ostiole being considered as one unit) within the square, a cell being counted if atleast half of its area lies within the square, provided two adjacent sides are considered for purpose of calculation.
5. Examine successive adjacent fields until about 400 cells are counted and calculate the stomatal number i.e., number of stomata per sq mm of leaf preparation. Calculate the stomatal Index using the formula:

Stomatal index= S*100/E+S

6. Determine the values for each surface where the leaf bears stomata on both surfaces.

3. Vein islet number and vein termination number

Vein islet number

It is defind as the number of vein islet per sq mm of the leaf surface midway between the midrib and the margin.

Vein termination number

Vein termination number refers to the number of vein endings per sq mm of a leaf surface midway between midrib and margin. It is used to describe the venation pattern of a leaf and can provide valuable information for plant identification and physiological studies.

Object

Determine the vein-islet number and veinlet termination number of the Abutilon crispum leaf.

Materials and reagents

Compound microscope, stage micrometer, camera lucida, drawing board, chloral hydrate solution, glycerin water.

Procedure

1. Boil a few leaves in chloral hydrate solution in a test-tube placed in a boiling water-bath. If the leaves are difficult to clear in this manner, soak them in water, treat succesively with chlorinated soda for bleaching, 10% hydrochloric acid for the removal of calcium oxalate and finally chloral hydrate solution.
2. Mount the preparation in glycerin water.
3. Set up the camera lucida and divide the paper into squares of 1 sq mm by means of the stage micrometer.
4. Replace the stage micrometer by cleared leaf preparation and the trace the veins in four continuous squares, either in a square of 2 mm x 2 mm or a rectangle of 1 mm x 4 mm. Trace the vein-islets and vemlet termination by looking through the microscope when a superimposed image of the leaf portion and paper is seen at the same time
5. Count the number of vein-islets and veinlet termination present within the square or rectangle and also by taking into consideration incomplete vein-islets on any two adjacent sides of the square or rectangle.
6. Divide the total number of vein-islets and veinlet termination numbers in four adjoining squares by 4 in order to get the value for one sq mm. Take atleast, ten sets of such counts.
7. Record the observations in the form of range and also indicate the mean value.

PHYSICAL EVALUATION

Physical evaluation comprises the determination of significant physical properties such as ash values, extractive values, moisture content, optical rotation, refractive index, and so on. The leaf powder of Abutilon crispum was examined for ash and extractive properties.

Ash values

The residue that remains after burning is the drug's ash content, which simply indicates inorganic salts that naturally occur in or adhere to the drug A crude drug's ash values can be total, acid insoluble, or water soluble. Phosphates, silicates, and silica make up the majority of total ash composition.

Total ash

Two grams of powdered drug were placed in a tarred silicon crucible. The powdered drug was burned at a temperature of no more than 450 degrees Celsius until it was carbon-free. The resulting ash was cooled and weighed.
The proportion of ash was estimated in relation to the air-dried drug.

Determination of acid insoluble ash

The total ash values were determined by the ash obtained from leaf and stem. When it is boiled separately with 25 ml of hydrochloric acid for a few minutes the insoluble ash is collected on an ash less filter paper and washed with hot water. The insoluble ash is transferred to the pre- weighed silica crucible, ignited, cooled, and weighted. The procedure is repeated to the constant weight. The percentage of acid insoluble ash was calculated with reference to the air-dried drug. The results were tabulated.

Determination of water soluble ash

The ash obtained as described in the determination of total ash is boiled for five minutes with 25 ml of water. The insoluble matter was collected on anashless filter paper ignited, cooled and weighed. The weight of the insoluble matter is subtracted from the weight of total ash. The difference in weight was considered as the water solubleash. The percentage of water soluble as his calculated with reference to air-dried drug. The results were recorded.

Determination of extractive value

Extracts obtained by exhausting crude pharmaceuticals indicate approximate measures of specific chemical components they include, as well as the diversity in chemical nature and qualities of the drug's contents.

Various solvents are used to determine extractives. The solvent used for extraction in capable of dissolving a significant amount of the desired material. Various approaches are used to determine the extractive values.

Determination of water-soluble extractive

Proceeded as directed for the determination of alcohol-soluble extractive, using chloroform water I.P as a solvent.

Determination of alcohol soluble extractive

About 5gm of the air-dried drug, finally powdered was macerated with 100ml of alcohol in a closed flask for 24hrs, with intermittent shaking every 6hrs, and left to stand for 18hrs. Filtered rapidly to prevent alcohol loss, then evaporated 25ml of the filtrate to dryness in a tarred flat-bottomed shallow dish, dried at 105^0c, and weighed. The percentage of alcohol-soluble extractive was estimated by referring to the air-dried drug.

Determination of moisture content

10gm of accurately weighed fresh Abutilon crispum leaves were placed in a tarred evaporating dish and dried at 105 °C for 5 hours before being weighed. Drying and weighing were performed at Ihr intervals until the difference between two successive weighing was no more than 0.25%. Constant weight was achieved when the difference in weight between two successive weighing was less than 0.01gm after 30 minutes of drying and cooling in a desiccators.

IV. PREPARATION OF EXTRACTS

The Ethanol extract of ***Abutilon crispum*** was prepared by maceration. First, the shoot parts of plants (fruit, leaves, stem) was collected, washed, and dried at a temperature not exceeding 40°C. After drying, the material was ground into a coarse powder using a mechanical grinder. A known quantity of the powder was placed in a clean glass container, and 70% ethanol was added in a 3:1 (v/v) ratio to the plant material.

The mixture was sealed and left to macerate at room temperature for 72 hours, with gentle shaking and stired it for the every 24 hours to facilitate extraction. After 72 hours, the mixture was filtered by Whatman filter paper to separate the solid plant material from the liquid extract. The filtrate was collected, and the ethanol solvent was then evaporated. The final extract was stored in a clean container in a cool, dry place.

V.PRELIMINARY PHYTOCHEMICAL ANALYSIS

Plants synthesize a variety of natural substances, including carbohydrates, proteins, and fats that humans eat, as well as other compounds like as tannins, glycosides, alkaloids, and essential oils that have physiological function. Both primary and secondary metabolites produced as a result of plant metabolism should be thoroughly investigated as part of an organized and comprehensive study of crude medicines. To determine the nature and chemical content of an extract, many qualitative chemical tests must be conducted. Chemical analyses, both qualitative and quantitative, are performed on the crude extracts or isolated constituents throughout the phytochemical screening procedure. Determining the composition of an extract or its fractions and isolating the active lead component are examples of qualitative chemical analysis. Using various analytical techniques including finger printing, quantitative chemical analysis involves determining the purity of a single substance or a set of compounds in a mixture. The following procedures were used to identify different phytoconstituents found in Abutilon crispum leaf extracts.

In the present study, the leaves of Abutilon crispum were collected, dried and subjected to size reduction to get uniform coarse powder. Then the powdered drug was also subjected to extraction with ethanol by maceration process and the concentrated extracts were used for phytochemical screening.

DETECTION OF ALKALOIDS

A small quantity of diluted Hcl was used to treat 50 mg of solvent- free extract before it was filtered. The filtrate underwent meticulous testing using a range of alkaloid reagents.

Mayer's reagent

2 drops of Mayer's reagent was added with few ml of filtrate. The presence of alkaloids is indicated by the appearing of a creamy precipitate.

Wagner's test

A few drops of Wagner's reagent were applied to a few ml of filtrate along the test tube's sidewalls. Alkaloids are present when a reddish-brown precipitate forms.

Dragendorff's reagent

1 or 2 drops of Dragendorff's reagent were added to a few ml of filtrate; the produce of a noticeable reddish-brown precipitate.

Hager's reagent

Add one or two ml of Hager's reagent to a few ml of filtrate. The appearance of a noticeable yellow precipitate suggests.

DETECTION OF CARBOHYDRATES

After dissolving about 100 mg of the extract in 5 ml of distilled water, it was filtered. Carbohydrate content in the filtrate was examined.

Molisch's test

2 drops of an alcoholic a-naphthol solution is mixed to two ml of filtrate. After giving the mixture a good shake, 1 ml of concentrated H2SO4 was gradually added around the test tube's edges. Carbohydrates are present when a violet ring forms at the intersection of 2 liquids.

Fehling's test

A small amount of the extract is heated with Fehling's solutions A and B, neutralized with alkali, and hydrolyzed with diluted hydrochloric acid. Red precipitate formation suggests the presence of reducing carbohydrates.

Benedict's test

0.5 ml of Benedict's reagent was added to 0.5 ml of filtrate. For 2 minutes, the mixture was boiled in a bath of boiling water. The presence of sugars is indicated by the formation of orange-red precipitate.

DETECTION OF GLYCOSIDES

About 50 mg of the extract was hydrolyzed for two hours in a water bath with strong Hcl in order to identify glycosides. The hydrolysate was then filtered and put through the following assays.

Borntrager's test

3 ml of chloroform was added to 2 ml of hydrolysate, and the mixture was agitated. After separating the chloroform layer, 10% ammonia solution was added. Anthraquinone glycosides are present when a pink color forms.

Legal's test

The extract was dissolved in pyridine in an amount of around 50 mg. 10% NaOH solution was used to turn the sodium nitro prusside solution alkaline. The development of a pink hue signifies the existence of glycosides.

Keller-kiliani test

2 ml of glacial acetic acid, two drops of 5% Fecl3 solution, and around 50 mg of the extract were dissolved and combined. One ml of sulfuric acid was then added. The presence of steroidal glycosides is indicated by the reddish

brown colour that appears at the intersection of the two liquid layers and the blue green colour that appears in the top layer.

DETECTION OF PROTEINS AND AMINO ACIDS

Protein and amino acid tests were performed on the filtrate after around 100 mg of extract was diluted in 10 ml of distilled water and filtered.

Million's test

Million's reagent (2 ml) was added to 2 ml of filtrate and brought to a boil. The presence of proteins or amino acids is indicated by the production of a white precipitate that becomes red when heated.

Biuret test

1 ml of a 10% sodium hydroxide solution was added to 1 ml of filtrate and brought to a boil. This was mixed with a drop of copper sulphate solution. The development of a violet-purple hue signifies the existence of proteins.

Ninhydrin test

A few drops of the 0.5% Ninhydrin reagent were added to the test solution, and it was then heated for a little while. A presence of amino acids is indicated by the production of violet or blue colour.

DETECTION OF PHYTO STEROLS

Leibermann - burchards test

A small amount of acetic anhydride was added to the extract in chloroform, and a small amount of strong sulfuric acid was put along the test tube's sides. The presence of steroids, triterpenoids is indicated by a red, pink, or violet colour at the liquid-liquid junction.

Salkowski test

A few drops of concentrated H2SO4 were added to the extract in chloroform, which was then thoroughly agitated and left to stand. Triterpenes are indicated by the production of a yellow-colored layer, whereas steroids are indicated by the formation of a reddish-brown coloured layer.

PHENOLIC AND TANNINS

Ferric chloride test

After dissolving around 50 mg of the extract in distilled water, a few drops of a neutral 5% ferric chloride solution were added. The presence of phenolic chemicals is indicated by the formation of blue, green, and black.

Lead acetate test

3 ml of a 10% lead acetate solution were added to a small amount of extract that had been diluted in distilled water. The presence of phenolic compounds is shown by the production of white precipitate.

Gelatin test

Add 1% gelatin solution containing NaCl to the test solution and bring it to a boil. The presence of tannins is shown by the production of white precipitate.

TEST FOR FLAVONOIDS

Shinoda test

A small amount of the extract was diluted in alcohol, and some magnesium turning pieces and conc. Hcl were added. The presence of flavonoids is indicated by the formation of a magenta or crimson red colour.

Alkaline reagent test

10% ammonium hydroxide solution was used to treat an extract aqueous solution. The presence of flavonoids is indicated by the production of a bright yellow colour that becomes less colorous when a few drops of diluted acid are added. A small amount of extract was dissolved in two ml of alcohol, and then sodium hydroxide was added in increasing amounts to the extract. It has a yellow colouring that, if flavonoids are present, decolorizes when an acid is added.

VI. FORMULATION OF OINTMENT

The ointment formulation will be prepared by incorporating the plant extract into a base, which may be a simple ointment base, or an emulsifying base, depending on the desired properties.

Table 1: formulation of ointment base.

S. No.	Name of ingredient	Quantity to be taken
1	Wool fat	0.5g
2	Cetostearyl alcohol	0.5g
3	Hard paraffin	0.5g
4	White soft paraffin	8.5g

Table 2: formulation of herbal ointment.

Formulation Code	Prepared abutilon crispum (g)	Ointment base q.s., (g)
F1	0.5	10
F2	1	10
F3	1.5	10

PROCEDURE FOR PREPARATION OF HERBAL OINTMENT

a) Initially prepare the ointment base by weighing accurately grated hard paraffin which is to be place in evaporating dish on water bath. After melting of hard paraffin add remaining ingredients and stir gently to aid melting and mixing homogeneously followed by cooling of ointment base.

b) Prepare the herbal ointment by mixing accurately weighed abutilon crispum extract to the ointment base by levigation method to prepare a smooth paste with 2 or 3 times its weight of base, gradually incorporating more base until to form homogeneous ointment, finally transferred in a suitable container**.**

VII. EVALUATION OF OINTMENT

PHYSIOCHEMICAL EVALUATION

Colour and odour

Physical parameters like colour and odour were examined by visual examination.

Consistency

Smooth and no greediness were observed.

Spreadability

The spreadability was determined by placing excess of sample in between two slides which was compressed to uniform thickness by placing a definite weight for definite time. The time required to separate the two slides was measured as spreadability. Lesser the time taken for separation of two slides results better spreadability. Spreadability was calculated by following formula:

$$S=M\times L/T$$

Where

S= Spreadability

M= Weight tide to the upper slide

L= Length of glass slide

T= Time taken to separate the slides

pH

pH of prepared herbal ointment was measured by using digital pH meter. The solution of ointment was prepared by using 100ml of distilled water and set aside for 2hrs. pH was determined in triplicate for the solution and average value was calculated.

Lod

LOD was determined by placing the formulation in Petridish on water bath and dried for the temperature 105^0C.

Solubility

Soluble in boiling water, miscible with alcohol, ether, chloroform.

Washability

Formulation was applied on the skin and then ease extend of washing with water was checked.

VIII.RESULTS AND DISCUSSION

PHARMACOGNOSTIC EVALUATION OF ABUTILON CRISPUM LEAVES

The macroscopy and microscopy of Abutilon crispum leaves were examined in this assessment. The following displays the findings from the investigations:

MACROSCOPICAL EVALUATION

Organoleptic characters

The plant's leaf was examined for its colour, flavor, and other organoleptic characteristics. The study's findings were displayed as follows:

Table 3: Organoleptic characters.

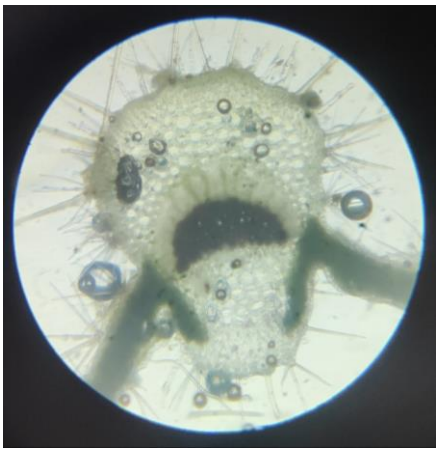
Colour	Greenish	**Leaf shape**	Ovate
taste	Bitter	**Leaf apex**	Acuminate
odour	Characteristic	**Leaf base**	Cordate
leaf	Alternate	**Leaf margin**	Crenate
arrangement	Distichous		
Leaf type	Simple		

MICROSCOPICAL EVALUATION

Transverse section of Abutilon crispum

Petiole

- Petiole is covered with numerous stellate trichomes.
- The cortical tissues are formed of parenchymatous and collenchymatous cells.
- The rows of vascular bundles are surrounded by a group of rosette crystals, scattered in the parenchymatous tissues.



T.S. of Abutilon Crispum Leaves

Midrib

- A single row of rectangular upper epidermal cells consists of group of stellate trichomes.
- Centre portion of midrib consists of xylem and phloem cells.
- Rosette crystals are scattered in the xylem and phloem region.
- Lower epidermal cells have greater number of stellate trichomes.

Lamina

- Bunches of stellate trichomes are visible in upper epidermis and more in lower epidermis.
- Mesophylls consists of rosette crystals and spongy parenchyma.

Stomatal Number and Stomatal Index

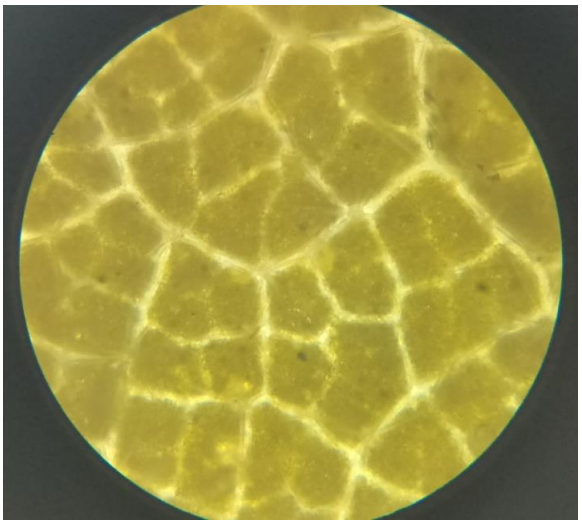
Actinocytic Stomata are present in Abutilon crispum leaves

Table 4: Stomatal Number and Stomatal Index on lower surface of the Abutilon crispum leaves.

No. of observation	No. of Stomata per unit areas (S) (40x)	No. of Epidermal cells (E) (40X)	S.I = S/E+S * 100
1	24	73	19.87%
2	18	67	
3	17	77	
4	15	89	
5	20	80	
6	24	72	
7	17	86	
8	24	75	
9	16	85	
10	18	74	
Total	193	778	

(Actinocytic Stomata are present in Abutilon crispum leaves)

Vein Islet Number and Vein Termination Number of Abutilon crispum leaves



(Vein Islet Number and Vein Termination Number of Abutilon crispum leaves)

- **Vein islet number 10.3-14.6 mm²**
- **Vein Termination Number 25.3-37.2 mm²**

Ash values

The Abutilon crispum leaves powder's total ash and acid insoluble ash levels were assessed. The outcomes, which were computed in relation to the medicine that had been air dried, are displayed below:

Total ash values: - 5.32% w/w

Acid insoluble ash values: - 0.54% w/w

Water soluble ash values: - 2.18% w/w

DISCUSSION

The evaluation of a crude drug is an integral part of establishing its correct identity. Before any crude drug can be included in herbal pharmacopoeia, pharmacognostical parameters and standards must be established. Therefore some diagnostic features have been evolved to identify and to differentiate the Abutilon crispum leaf from the other crude drugs and its adulterants.

Macroscopic Characteristics: The leaves are greenish, bitter, and possess a characteristic odor, suggesting the presence of beneficial phytochemicals that align with traditional uses in herbal medicine.

Microscopic Structure: The examination revealed key features such as stellate trichomes on the petiole and lamina, which likely serve protective functions. The vascular structure is well-developed, with xylem and phloem facilitating efficient nutrient transport, and the presence of rosette crystals suggests mineral storage.

Stomatal and Vein Analysis: Actinocytic Stomata are present in Abutilon crispum leaves. The stomatal index of 19.87% indicates a balanced capacity for gas exchange, crucial for photosynthesis. Vein islet number and vein termination number are 10.3-14.6 mm^2 and 25.3-37.2 mm^2 respectively which can help to identify the closely related species.

PRELIMINARY PHYTOCHEMICAL ANALYSIS OF ABUTILON CRISPUM LEAVES EXTRACT

Preparation of extracts

By using ethanolic leaves extracts of Abutilon crispum were dried and evaporated. Ethanolic extract of Abutilon crispum leaves colour, consistency and percentage yields were noted in the table.

Table 5: % yield and physical appearance of Ethanolic extracts of leaves of Abutilon crispum.

S. No	Extract	% Dry weight	Colour	Consistency
1.	Ethanolic Extract	12.4%w/w	Dark green	Resinous

Qualitative phytochemical screening

Here, Ethanolic extracts of the leaves of ***abutilon crispum*** were subjected to preliminary test and responded positively for the presence of carbohydrates, protein, flavanoids, phenolic and tannins, glycosides, steroids terpenoids and alkaloids.

Preliminary Phytochemical Evaluation of Abutilon crispum

Table 6: Preliminary Phytochemical Evaluation of Abutilon crispum.

Test	Ethanolic Extract
Carbohydrates	
Molish test	+
Fehlings test	+
Benedicts test	+
Barfoed test	-
Flavonoids	
Shinoda test	+
Alkaline test	+
Extract+NaoH	+
Extract+lead acetate	+
Proteins	
Biurat test	-
Millon's	+

Aminoacids	
Ninhydrine test	-
Steroids-Terpenoids	
Salkowski Reaction	+
Liebermann-burchard Reaction	+
Phenolics and Tannins	
ferric chloride test	+
lead acetate test	+
Alkaloids	
Mayer's test	-
Hager's test	-
Dragendorff	-
Wagner's	-
Glycosides	
Keller-killiani test	+
Brontrager test	-

‘ + ’Positive **‘ - ’Negative**

DISCUSSION

The preliminary phytochemical evaluation of ***Abutilon crispum*** leaves revealed the presence of several key bioactive compounds, including significant levels of alkaloids, flavonoids, tannins, saponins, terpenoids, and phenolic compounds.

Alkaloids Present in significant amounts, which are linked to various pharmacological activities. While flavonoids exhibit strong antioxidant activity, contributing to the plant's potential in reducing oxidative stress and chronic disease risk. Tannins provide astringent and antimicrobial effects, whereas saponins may support cardiovascular health through cholesterol- lowering effects. Terpenoids reinforce anti-inflammatory benefits, and high phenolic content enhances overall antioxidant capacity. The phytochemical evaluation confirms that ***Abutilon crispum*** is a rich source of bioactive compounds with considerable health benefits.

FORMULATION AND EVALUATION OF ABUTILON CRISPUM

(Levigation Method)

(Filling)

(Packing)

PHYSICAL PROPERTIES OF HERBAL OINTMENT

The formulated ointment is evaluated for its physical properties like colour, odour and state. The Formulated ointment are semisolid in nature, characteristic odour is occurred and greenish in colour. The texture of ointment is smooth. By visual appearance and touch its confirm that all formulation produces uniform distribution of extract in ointment.

Table 7: Physical properties of herbal ointment.

S. No	Specification	Limit
1	state	Semi solid
2	odour	characteristic
3	colour	greenish
4	texture	smooth

DETERMINATION OF pH

The pH of the ointment was found to be in range of 5-6.5 which is good for skin pH. All the herbal formulation of ointment were shown pH near to the skin required. i.e. F1- 5.5, F2-6 and F3-6.4. The observed pH are near to the skin pH.

Table 8: pH of formulation.

S. No	Formulation	pH
1.	F1	5.5
2.	F2	6
3.	F3	6.4

DETERMINATION OF SPREADABILITY

The Spreadability plays a considerable role in patient compliance and ensures uniform application of ointment to a large area of the skin. The low value of spreadability coefficient of the ointment was sufficient suggesting easy spreading. The lower value of spreadability indicates the lesser work required to spread the ointment over the skin. Which means formulation was easily spreadable by applying small amount of shear. The spreadability test showed that formulation has good spreadable property.

Evaluation parameters of herbal ointment

Table 9: Determination of Spreadability.

S. No	formulation	spreadability
1	F1	27.5 sec
2	F2	30 sec
3	F3	31 sec

Evaluation parameters of herbal ointment

Table 10: Evaluation parameters of herbal ointment.

S. No.	Colour	pH	Spreadability	Texture
1	Greenish	5.5	27.5 sec	smooth
2	Greenish	6	30 sec	smooth
3	Greenish	6.4	31 sec	smooth

Physicochemical evaluation of formulated ointment

Table 11: Physicochemical evaluation of formulated ointment.

S. No.	Physicochemical parameters	Observation
1	Colour	Greenish
2	Odour	Characteristic
3	Consistency	Smooth
4	pH	5.5
5	Spreadability	27.5 sec
6	Loss on drying	20 %
7	Solubility	Soluble in boiling water, miscible with alcohol, ether, chloroform
8	Washability	Good

DISCUSSION

The present study was done to prepare and evaluate the herbal ointment. For this the herbal extracts were prepared by using simple maceration process to obtain a good yield of extract and there was no any harm to the chemical constituents and their activity.

The levigation method was used to prepare ointment so that uniform mixing of the herbal extract with the ointment base was occurred which was stable during the storage.

The physicochemical properties were studied which shows satisfactory results for colour and odour, pH, consistency, spreadability, Washability, Solubility, Loss on drying.

XI. SUMMARY AND CONCLUSION

The pharmacognostical study is a major and reliable criterion of identification of plant drugs. The pharmacognostic parameters are necessary for confirmation of the identity and determination of quality and purity of a crude drugs.

The present study may be useful to supplement information in respect to its identification, authentication and standardization of herbal drugs. In other words, the pharmacognostic features in this study may serve as a valuable source of information tool for identification of the plant for validation of the raw material and for standardization of its formulations at herbal industrial level in the coming days. Studies on physico-chemical constants can serve as a valuable source of information and provide suitable standards to determine the quality of his plant.

The preliminary phytochemical evaluation of Abutilon crispum leaves revealed the presence of several key bioactive compounds, including significant levels of alkaloids, flavonoids tannins, saponins, terpenoids, and phenolic compounds. These phytochemical evaluation confirms that Abutilon crispum is a rich source of bioactive compounds with considerable health benefits.

From the ancient time abutilon crispum leaves are used for their various medicinal properties like antioxidant, antidiabetic, anti-inflammatory etc. thus this ointment could become a media to use these medicinal properties effectively and easily as a simple dosage form. The results of different tests of ointment showing that the formulation could be used topically in order to protect skin against damage the comparison of F1, F2 and F3 the F1 produce better activity than F2 and F3.

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