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PHARMACOGNOSTICAL & PHYTOCHEMICAL EVALUATIONS OF CHENOPODIUM ALBUM LINN. LEAF

Akhilesh Kumar Ratre[1*], Lalchand[2], Pravin Kumar Joshi[3]

[1,2]M.D. Scholar,[3]Professor & H.O.D.,
Post Graduate Department of Dravyaguna, Govt. Ayurvedic College Raipur Chhattisgarh, India

Email: drlal4ayurved@gmail.com

ABSTRACT

The present study aimed at detailed pharmacognostic evaluation of the crude drug, Morphoanatomy of the leaves of C. album Linn was studied with the aim to aid pharmacognostic and taxonomic species identification using light and confocal microscopy, WHO suggested physico-chemical determinations and authentic phytochemical measures. Chenopodium album Linn (Family- Chenopodiaeacae) is a very common plant. It is also known as fat-hen, Bathua, Vastuka, Chakvit. It has been found to have antipruritic, antinociceptic and sperm immobilizing activity. These properties are mainly due to presence of various bioactive compounds. Different extracts were prepared using the soxhlation method and these were used for phytochemical analysis and to determine various pharmacognostic parameters. The findings of the current study can be useful to progress and further scientific investigation on the leaf, stem, root of this species. The present study aims at developing a standardized profile of leaf, stem and root of C. album which would be of immense use to identify and establish the authenticity of the plant C. album.

Keywords: *C. Album* Linn., *Bathua*, Pharmacognostical, Phytochemical

INTRODUCTION

India has a rich cultural heritage of traditional medicines which chiefly comprised the two widely flourishing systems of treatments i.e. Ayurvedic and Unani systems since ancient times1. Herbal medicines, also referred to as botanical medicine or phytomedicine, include herbs, herbal materials, herbal preparations and finished herbal products that contain parts of plants or other plant materials as active ingredients the both Ayurveda, Unani and Siddha system of medicine use plants and minerals as source of drugs, plants are major source of medicine[1]. Demand for herbal products has been growing and import and export of plant materials is also increasing in recent years. The phytochemicals having unknown pharmacological activities are extensively evaluated for use in medicines[2].

Chenopodium album Linn (Family- Chenopodiaeacae) very common plant. It is also known as fat-hen, *Bathua, Vastuka, Chakvit*. It is an important medicinal plant in Ayurveda that cures leukoderma, epilepsy, fever, cough and abdominal pain. The species are cul-

tivated as a grain or vegetable crop as well as animal feed in asia[3]. It has been found to have flavonoid as phenolic amide, saponin, cinnamic acid amide, alkaloid, chinoalbicin, apocortinoid, xyloside, phenols and lignans as active phytoconstituents. It is reputed to be a medicinal plant in scientific and folkloric literature and its medicinal values are well documented. It has been found to have antipruritic, antinociceptic[4] and sperm immobilizing activity[5].

Aim & Objectives

The aim of the present work is Pharmacognostic & Phytochemical evaluation of leaves of Chenopodium album Linn.

Material & Methods

Collection of the plant: Leaves of Chenopodium album Linn. And Amaranthus spinosus Linn. was collected in Bilaspur regions (19.10710 N latitude and 81.95350 E longitude) of Chhattisgarh, India. Fresh leaves were collected from field and washed; shade dried and packed in a paper bag for further physicochemical, phytochemical and antioxidant analysed.

Authentication of the Drug

A voucher specimen of the collected plant material was prepared, authenticated Mr. RS Jayasomu Senior Principal Scientist Head, RHMD and CSIR-NISCAIR institute and Drug Testing & Research Laboratory, Raw Material Herbarium and Museum Delhi.

Instruments & Chemicals

For Pharmacognostic study: Compound binocular microscope (Olympus-CH20i model) with built in analogue camera (CMOF, 1.4 megapixel), camera lucida (prism type/plane type), stage micrometer, glass slides, cover slips, watch glass and other common glasswares were used during the microscopic study. Solvents viz. formalin, glacial acetic acid, ethyl alcohol and reagents viz. safranin, glycerine, chloral hydrates were procured from Ranbaxy Fine Chemicals Ltd., Mumbai, India.

Macroscopic Characteristics: For morphological observations, leaves were used. The macromorphological feature of leaves was observed under magnifying lens, and photographed using digital camera (DSC W220, Sony Corp, Japan).

Microscopic Characteristics: Free hand section of stem was taken and stained by the reagent safranine to confirm its lignification. Powder microscopy was also carried out and their specific diagnostic characters were recorded. Photomicrographs were obtained by observing the sections under compound binocular microscope and the figures of the section were drawn with the help of Camera Lucida.

Phytochemical Study

Fluorescence analysis: The leaf powders were subjected to fluorescence analysis, as it is and after treating separately with 1N NaOH, H2SO4, HNO3, NH3, Iodine, Fecl, Acetic acid against normal and ultraviolet light (254 am & 366 nm).

Extraction of Plant materials: The stem bark of Chenopodium album was dried in shade under normal environmental condition and subjected to size reduction. Such powdered drug was charged into Soxhlet apparatus and extraction was carried out with Methanol & water.

Physicochemical parameters: Leaves were studied for various physicochemical standards like foreign matter, loss on drying at 105°C, total ash, acid-insoluble ash, alcohol soluble extractive and water-soluble extractive using standard methods.

Preliminary phytochemical analysis[6,7]: To check the presence or absence of primary and secondary metabolites in following extracts like petroleum ether, chloroform, ethyl acetate, acetone, methanol, and hydroalcoholic of leaves of Chenopodum album Linn. It was subjected to preliminary phytochemical screening.

For Phytochemical study: A CAMAG HPTLC system (Muttenz, Switzerland) equipped with a semi-automatic TLC applicator Linomat IV, twin trough plate development chamber, Win CATS software version 1.4.2. and Hamilton (Reno, Nevada, USA) Syringe (100 µl).

All chemicals, reagents and solvents used during the experimentation were of analytical grade were purchased from E. Merck Pvt. Ltd. (Mumbai, India).

Fig.1: Whole plant of *C.album*

Fig.2: Leaf of *C.album*

Fig.3: Inflorescence of *C.album*

Fig.4: Seeds of *C.album*

Results

Pharmacognostic study

a. Organoleptic characters -

Color: Dark greenish, dry brown
Odour: Aromatic
Shape: Rhomboid
Stem Color: Light green, angular
Seed Color: Black
Taste: Acidic

b. Macroscopic characters -

Part: Leaf
Occurrence: Pieces
Shape: Curved
Size: 2 to 5 cm long and 1 to 3 mm thick
Colour: Greenish
Odour: Odourless
Taste: Bitter

c. Microscopic characters

The diagnostic characters are:

Epidermis: It is uniseriate and cuticularized. It is wavy in outline.

Cortex: It is parenchymatous and bounded internally by a starch sheath layer.

d. Powder microscopy -

Organoleptic characters

Colour: Greenish
Odour: Odourless
Taste: Acidic
Touch: Smooth

Detailed TS shows upper and lower epidermis of the midrib and lamina covered with thin cuticle, the cells of the upper epidermis being bigger in the sized and bear plenty of simple and covering straight or bent short and long trichome, Stomata traversed throughout both the epidermis being more on the lower side, a row of palisade runs underneath the upper epidermis

of the lamina, discontinuous over the midrib, midrib lies 2 to 3 rows of the collenchymatous tissue, the remaining cells of the ground tissue being parenchymatous embedded with an arc of centrally located 4 vascular bundles being located at upper side.

Physiochemical analysis

Table 1: Physicochemical characters of *C.album* leaf

S.N.	Physicochemical Parameters	Results
1.	Foreign Matter	Nil
2.	Total Ash (Average value in w/w)	17.059%
3.	Loss on drying	4.708%
4.	Acid Insoluble Ash (Average value in w/w)	4.174%
5.	Alcohol Soluble extractive (Average value in w/w)	5.420%
6.	Water Soluble extractive (Average value in w/w)	42.312%

Table 2: Fluorescence analysis of *C. album* Linn. powder of leaf

Powder drug+ reagents	Visible light	UV Short254 nm	UV Long366nm
Powder as such	Dark Green	Fluorescent green	Fluorescent green
Distilled Water	Dark Green	Fluorescent green	Fluorescent green
Glacial acetic acid	Light Green	Fluorescent green	Fluorescent green
Picric acid	Yellowish green	Yellow	Yellow
In HCL	Brown	Brown	Dark Brown
IN H_2SO_4	Dark Brown	Red	Dark red
Conc. HNO_3	Dark red	Light green	Light green
IN NaOH	Dark red	Dark green	Fluorescent green
Ferric Chloride	Red brown	Red	Red
Iodine Solution	Bluish	Dark green	Bluish green
Ammonia Solution	Green yellow	Green yellow	Light Green
Potassium Dicholomate	Orange	Brown	Brown
Ethanol	Dark green	Light green	Light green
Methanol	Dark green	Light green	Light green

Table 3: Preliminary phytochemical screening

S. N.	Plant constituent (Test)	Test/Reagent	Water	Alcohol
01	Test for Steroids	Salkowski reaction, Liebermann-Burchard test	Negative	Positive
02	Test for Alkaloids	Dragendorff"s reagent Mayer's reagent,Hager's reagent, Wagner's reagent	Negative	Positive
03	Test for Tannins	Ferric chloride test, Lead acetate test Potassium dichromate	Positive	Positive
04	Test for Flavonoids	Shinoda test	Positive	Positive
05	Test for Carbohydrates	Molish's test, Barfoed's test	Positive	Positive
06	Test for Proteins	Biuret test, Xanthoproteic test	Positive	Positive
07	Test for Saponins	Foam test	Positive	Positive
08	Test for Amino acid	Ninhydrin test	Positive	Positive
09	Test for Reducing sugar	Molisch's test Barfoed's test	Positive	Positive

10	Test for Monosacchrides	Molisch's test Barfoed's test	Positive	Negative
11	Test for Pentose sugar	Molisch's test Barfoed's test	Negative	Positive
12	Test for non- reducing sugar	Molisch's test Barfoed's test	Negative	Negative
13	Test for Hexose Sugar	Molisch's test Barfoed's test	Negative	Negative
14	Test for Glycosides	-	Positive	Negative

DISCUSSION

Chenopodium album Linn. was identified and authenticate by different floras, botanically and pharmacognostically. Each specie has its own characteristic features. Organoleptic characters of *Chenopodium album Linn.* leaf was same as described in Ayurvedic Phamacopia of India. It has dark greenish and dry brown in colour. It has Characteristic or aromatic Odour. It has Sweet taste, Fracture – small cut pies. Macroscopic characters are Shape-Rhomboid, Surface smooth, size 2-5cm long and 1-3 mm thick. Power microscopy was colour-Brownish, Odour- Characteristics odour, Taste Sweat, Touch fine, Diagnostic characters are of the powder show, Cork cells- Thick walled, lignified, Stone cells- In groups, Crystals - Calcium oxalate, Starch grains-Simple, round to oval, Fibre -Thick walled with pointed ends and narrow lumen.

Florescence analysis helps in detecting the various constituents like phenolic compound, flavonoids, steroid, and other natural compound based on different florescence with different chemical reagents. This study helps in authentication of the plant. Result of given samples shows that similar florescence character that means 2 samples have similar chemical constituents.

Phyto-chemical analysis

- Tannins, flavonoids, Carbohydrates, Proteins, Saponins and Amino acid were present.
- Tannins are medicinally significant due to their astringent's properties. They are also used in gastro-intestinal disease like diarrhea etc.
- Flavonids shows anti-inflammatory and antimicrobial activity.
- Saponin shows hypocholesterolaemic, immunostimulant, anticarcinogenic and antioxidant properties.
- Proteins are essential for the human body. They are one of the building blocks of body, tissue and can also serve as a fuel source, as a fuel protein provide as much energy density as carbohydrates.
- Amino acid is used to provide a concentrated specific and efficient intake of required nutrient components in medical foods for malnourished proteins elderly people with lower digestive capabilities as well another use.

CONCLUSION

The pharmacognostic and phytochemical studies were carried out on leaf of *Chenopodium album Linn.* The morphological, macroscopial and microscopical features observed during the study will be helpful for proper identifications of these plant species. The physico-chemical parameters are important analytical features and are constant within a range. The preliminary phytochemical analysis revealed the presence of different chemical constituents in crude extracts. This study will be helpful for quality control of single and poly herbal formulations. These chromatographic studies will be helpful as a tool in quality control of the raw materials and finished products. This marker analysis of phyto-constituents may also be helpful in phytoequivalence studies and other parameters can be established by studying the absorption, distribution, metabolism and elimination of pharmacologically active agents in the body.

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