

RESEARCH ARTICLE

Pharmacognostical Investigation of *Trapa natans* L Leaves

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ABSTRACT:

Background: *Trapa natans* L., is annual aquatic plant generally known as Water caltrop, Water chest nut belonging to the Trapaceae or Lythraceae family. *Trapa natans* L is used for the treatment of wide no of diseases without proper standardization. **Objective:** To give the right pharmacognostical and photochemical information of the *Trapanatan* L leaves. In this study pharmacognostical investigation of the fresh leaves and powder drug were done to determine the macroscopical, microscopical, quantitative physicochemical and phytochemical property of the drugs. **Method:** Macroscopical, quantitative and qualitative microscopy, physicochemical evaluation, extractive value, fluorescence analysis and phytochemical analysis were done according to the WHO guideline. **Result:** Macroscopical analysis showed that, leaves are greenish to purplish color, rhomboidal shape; alternate, acute, margin is dentate, pinnate venation. Microscopic evaluation showed that leaf is dorsiventral in nature, upper layer epidermis cells were covered with cuticle layer. Single layer of barrel shape cell were present below the upper epidermis layer. Trichomes are generally multicellular. Anomocytic stomata were observed in upper epidermis. From the experiment it was found that methanolic extract give the highest extractive value. Phytochemical analysis gives the evidence for the presence of carbohydrate, alkaloids, glycoside, steroids, flavonoids, tannin, and triterpenoids. Qualitative phytochemical analysis give the evidence for presence of high amount total phenolic content. Conclusion: Different pharmacognostical parameters assessed in this examination help to detection and standardization of *Trapa natans* L., leaves.

KEYWORDS: *Trapa natans* L leaf, standardization, macroscopic and microscopic analysis, physicochemical and phytochemical evaluation.

INTRODUCTION:

Nature provide abundant number of plants and has possible all solution for human disease. Science the ancient times nature is the back bone of the health care system. It is unfeasible to find any plant which has no therapeutic value^{1,2}. It is cleared that the natural products play the major role in the drug development system. Although uses of synthetic medicine is growing due to the cost, quick action, easy to evaluation but there was a big question mark about their safety profile^{3,4}. Now a day 80% of the developing country's people rely on the natural products as the most reliable sources for medicines⁵.

Trapa natans L., is the very significant medicinal plant belong to the family Trapaceae or Lythraceae. *Trapa natans* L., is also known as Water Caltrop or Water Chest Nut. *T natans* is the free-floating plant, grow in ponds and lake in slightly acidic condition and in sunny position⁶. The chemical compounds cycloeucaenol and ursolic acid were isolated from this plant. The *Trapa natans* L., fruits contain high amounts of minerals such as calcium, phosphate, iron, magnesium, and manganese. The inner part of the fruits also contains vitamin A, vitamin B, vitamin C, riboflavin, and nicotinic acid. This plants also contain high amounts of antioxidants such as phenol, flavoin and flavonoids^{7,8}. In Ayurvedic framework *Trapa natans* L., is a vital plant, used in the stomach problems, genitourinary system diseases, liver disorder, kidney damage and so on. From the various literature survey it was found this plant also used for fever, inflammation, diarrhea, and leprosy. Various pharmacological investigation give the evidence that *T.*

Natans posse analgesics activity, anti-diabetic activity, immunomodulatory activity and nortropic activity⁹.

From the review of literature it can conclude that no systematic pharmacognostical investigation was done on the leaf of the *Trapa natans* L., Therefore this present study deals with macroscopical, microscopical and phytochemical investigation of *Trapa natans* L leaf, which will be treat as reference standard for identification, characterization authentication of the plant from the adulterant's product.

MATERIALS AND METHODS:

Trapa natans L., plants were collected from Purulia district, West Bengal, in November 2018. *Trapa natans* L., was identified and authenticated by Dr. Anjula Pandey, Principal Scientist, National Bureau of Plants Genetic Resource (NBPGR), New Delhi.

Macroscopy:

Plant was collected, wash and cleaned properly with water and shade dried and kept for the farther investigation. The following macroscopical investigation of the plant leaves were noted for example color, order, flavor, size, apex, margin, venation, presence or absence of petiole, base surface, lamina, texture and so on¹⁰

Microscopy:

Leaf microscopy:

Transverse section of leaf was stained by the safranin and phloroglucinol according to the standard method and observed under Trinocular Microscope. Photos were capture by camera lucida for common and specific character.

Powder microscopy:

Powder microscopy is useful for further pharmacological and therapeutic evaluation along with the standardization of plant material. In powder microscopic examination powder drug was treated with different reagents like Phloroglucinol, Conc. HCl, Ruthenium red after that powder materials ware observed under the microscope¹¹.

Physicochemical Analysis:

The epidermal strips of leaves were subjected to the qualitative microscopy to determine the palisade ratio, stomatal index, stomatal number, vein termination number, vain islet number. The other physical parameter of the powder drug such as moisture content, total ash, acid insoluble ash, water- soluble ash and loss of drying values were determine as per WHO guideline¹².

Fluorescence analysis:

Fluorescence analysis of powdered drug were done by placing the dry powder leaf on a slide and treated with various chemical reagents and then observed by the UV

and Visible light. The developed colour were noted within 1-2 minutes to avoid drying^{13,14}.

Extractive value with different solvents:

Kwon quantity of powder drug was taken extracted with different solvent (nonpolar to polar) like petroleum ether, chloroform ethyl acetate, ethanol, and methanol. After that filtrate found from various solvent were evaporated and weight of the extracts were taken. Percentage of the extractive values percentage were determined in regard to initial weight of the dried powder drug. Which solvent was given the highest extractive value will subjected for the farther investigation¹⁵

Phytochemical analysis: For phytochemical screening various solvent extract were taken and treated with the various chemical reagent. Given below in the Table 3¹⁶.

Quantitative phytochemical estimation:

Total phenolic content determination:

The total phenolic content of *Trapa natans* L., was estimates by the Folin-Ciocalteu assay method. Total phenolic content was determine by diluting the crude extract with suitable solvent to attain the dilution range 0.0-100µg of the galic acid/ml. The prepares extract mix with 1ml of distilled water and 250µl of Folin-Ciocalteu reagent. After that 2.5ml of 7% Na₂CO₃ solution added to it and allowed to stand for 6 minutes. Absorption of the sample was measured after 90 minutes by UV-VIS spectroscopy. By following the method standard solution of gallic acid was prepared. Standard curve of gallic acid prepared to determine the concentration of phenolic content of the extract. Total phenolic content express as mg of GAE/g dry weight¹⁷.

Determination of Total flavonoid:

Total Flavonoids content was estimate determine by extracting 10gm of powder drug with 100ml 80% methanol water. The obtained extract was filtrate through the What man filter paper (No 42) The whole. Filtrate transferred into crucible and evaporated until constant weight obtained. Flavonoid's content of *Trapa natans* L., leaves extract was determine by the aluminum chloride colorimetric assay method and express as mg Chrysin equivalents (CE)/ 100 g dry weight¹⁸.

Determination of Total alkaloid determination

Total alkaloids contents of *Trapa natans* L., extract measured by Bromocresol green colorimetric assay. The Total alkaloids content of the extracts was expressed as percentage of atropine equivalent per 100 gm dry weight of sample.¹⁹

RESULTS:

Macroscopy:

From the microscopical evaluation it was found that leaves are dark greenish color and beneath part is radish