



RESEARCH ARTICLE

Preliminary Phytochemical analysis of Root Extracts of *Coleus forskohlii* Briq:**Poornima Atulkar¹, Ritu Thakur², Pratibha Singh³**

Department of Botany, Sarojini Naidu Girls Government P.G.(Autonomous) College Bhopal (M.P.), India.

Manuscript Info**Manuscript History:**

Received: 12 October 2015

Final Accepted: 25 November 2015

Published Online: December 2015

Key words:***Corresponding Author****Abstract**

Coleus forskohlii is an important medicinal plant which are used in many multiple medicinal purposes as antispasmodic, stimulant and stomachic and is used for the treatment of headache, fever, epilepsy and dyspepsia. It is used to treat conditions such as indigestion, diarrhoea, nervous tension, insect bites, toothache, earache, rheumatism, whooping cough, and bronchitis. The present study was aimed to investigate the phytochemical analysis of *Coleus forskohlii* root. The root extracts of *Coleus forskohlii* were prepared using different solvents like petroleum ether, ethanol, Chloroform and distilled water and the phytochemical screening was performed. The highest phytoconstituent were present in ethanol extract such as alkaloids, Carbohydrate, quinones, phenols, tannins, terpenoids, glycosides, steroids and saponins and terpenoids compared to other extract.

Copy Right, IJAR, 2015.. All rights reserved

INTRODUCTION

Herbal medicine has been practiced worldwide and is now recognized as an essential building block for primary healthcare **Onayed, et.al (2009)**. Anatomical character of powdered drug have become an important tool for identifying authentic drugs since, adulteration of both drugs and food articles has become very common. Quality control of a crude drug and its pharmaceuticals can be attempt by different methods of evaluation depending upon the morphological and microscopical studies of the crude drugs and their physical, chemical and biological behaviour **Felix, et.al (2009)**.

Coleus is a name which derived from an earlier classification under the genus name *Coleus* which is currently included in either *Solenostemon* or another genus *Plectranthus*. The word *Coleus* came from the Greek "koleus, meaning sheath. It was studied that there are 150 species were considered to be originated from Himalaya of Kumaon in Nepal, Bihar and Deccan peninsular of south India as well as Srilanka. It has been distributed to Egypt, Arabia, Ethiopia, Tropical East Africa and Brazil.

It is a genus of perennial plants, native to tropical Africa, Asia, Australia, The East Indies, The Malay Archipelago, and the Philippines. It is commonly known as "Indian/ country borage" and 'Pathorchur' in Hindi and Bengali **Kumar et.al (2007)**. It was recorded in the Indian system of medicine as one of the sources of Pashanabheda **Chopra et.al (1956)**. In India, the plant was found on dry, barren hills at an altitude of about 2400 m with moderate rainfall of 400-500 mm and a mean annual temperature of 18-27°C. The crop is being commercially grown in large area in Madhya Pradesh, Maharashtra, Kerala, Karnataka and Tamil Nadu. *Coleus forskohlii* is a perennial plant that grows to about 45-60 cm tall and aromatic in nature. It has four angled stems that are branched and nodes are often hairy. Leaves are 7.5 to 12.5 cm in length and 3 to 5 cm in width, usually pubescent, narrowed into petioles. Inflorescence is raceme, 15-30 cm in length, flowers are stout, 2 to 2.5 cm in size, usually perfect and calyx hairy inside. Many cultivators of the Southeast Asian species *Coleus* have been selected for their colourful variegated

leaves, usually with sharp contrast between the colors where the leaves are green, pink, yellow, maroon, and red **Uphof et.al (1959)**.

Plants are rich in a great diversity of phytochemicals such as phenolic acids, flavonoids, tannins, lignin, and other small compounds **Cowan et.al, (1999)**. Its tuberous roots were found to be rich source of forskolin (Coleonol) used as a potential drug for hypertension, obesity, bronchitis, asthma, respiratory disorder, painful urination, insomnia and psoriasis **Ammon et.al (1982)**. Clinical studies forskolin also indicate it may have therapeutic benefit in angina and prevention of cancer metastases **Ammon et. al (1985)**. *Coleus forskohlii* has been used for treating heart diseases, abdominal colic, respiratory disorder, insomnia, convulsion, asthma, bronchitis, intestinal disorder, burning sensation, constipation, epilepsy and angina **Ammon and Muller (1985)**. This plant constitute various natural bioactive compounds are phenolics, terpenoids, alkaloids, saponin, tannins that may produce health beneficial effect by scavenging free radicals **Rout et. al (2012)**. The present studies indicate that ethanol solvent extract of *Coleus forskohlii* contain medicinally important bioactive compounds and this justifies the use of plant species as traditional medicine for treatment of various diseases and ailments.

Materials and method:

Plant material

Coleus forskohlii plants were collected from Sarojini Naidu Girls Govt. P.G. (Autonomous) College Bhopal, Madhya Pradesh in the month of July. The plant was authenticated from Laghu Vanupaj Prasannskarn & Anusandhan Kendra Barkheda Pathani, Bhopal (MP). Roots were washed under running tap water twice with distilled water to remove the adhesive contaminants and dust particles and dried under shade. Finally the samples were crushed and converted into powdered form and stored in airtight bottles for further analysis

Preparation of Plant Extracts

The shade dried, and powdered roots were subjected to successive extraction in a soxhlet extractor using petroleum ether, ethanol, chloroform and distilled water. The extracts were filtered and the filtrates were concentrated under reduced pressure to obtain the extracts as solid residues **Harbone et.al (1984)**.

Phytochemical analysis of Plant

Preliminary phytochemical tests of various extract of root powder of *Coleus forskohlii* were performed for phytochemical analysis of alkaloids, glycosides, carbohydrates, Quinones, Phenols, Tannins, Saponins, Steroids, and Terpenoids according to standard methods **Sai Ramesh et. al (2010) Harbone et.al (1973), Trease and Evans et.al (1989)**.

Test for alkaloids:

Mayer's test: Take 1 ml of the extract, add 1 ml of Mayer's reagent (Potassium mercuric iodide solution). Whitish yellow or cream coloured precipitate indicates the presence of alkaloids.

Test for Glycosides:

Baljet test: Take 1ml of the test extract, add 1ml of sodium picrate solution and the yellow to orange colour reveals the presence of glycosides.

Test for Carbohydrates:

Molisch's test: Take 2ml of the extract, add 1ml of α - naphthol solution and add concentrated sulphuric acid through the side of the test tube. Purple or reddish violet colour at the junction of the two liquids reveals the presence of Carbohydrates.

Test for Quinones: One ml of each of the various extracts was treated separately with alcoholic potassium hydroxide solution. Quinines give coloration ranging from red to blue.

Test for Phenols: Take 1ml of various solvent extracts of sample, 2ml of distilled water followed by a few drops of 10% aqueous ferric chloride solution were added. Formation of blue or green colour indicated the presence of phenols.

Test for Tannins: Take the little quantity of test solution and mixed with basic lead acetate solution. Formation of white precipitates indicates the presence of tannins.

Test for Saponins: Take small quantity of alcoholic and aqueous extract separately and add 20 ml of distilled water and shake in a graduated cylinder for 15 minutes lengthwise. A 1cm layer of foam indicate the presence of saponins

Test for Steroids: Libermann-Burchard test: 1gm of the test substance was dissolved in a few drops of chloroform, 3ml of acetic anhydride, 3ml of glacial acetic acid were added, warmed and cooled under the tap and

drops of concentrated sulphuric acid were added along the sides of the test tube. Appearance of bluish-green colour show the presence of sterols.

Test for Terpenoids:

Noller's test: Dissolve two or three granules or tin metal in 2ml thionyl chloride solution. Then add 1ml of the extract into test tube and warm, the formation of pink colour indicates the presence of terpenoids.

Result and discussion:

The present study revealed that *Coleus forskohlii* root extract used to different solvent such as Petroleum ether, chloroform, ethanol and distill water.

The result was showed that maximum phytoconstituent were present in ethanol extract. The ethanol extract was subjected to different qualitative phytochemical tests for detection of different biologically active chemical groups. In these screening process sterols, lipids/fats, glycosides, phenols, carbohydrates, tannins, resins, reducing sugars, saponins, flavanoids and acidic compounds gave positive results (Table).

Phytochemical screening of the ethanol, methanol, distil water root extracts of *Coleus forskohlii* showed the presence of secondary metabolites such as flavonoids, phenols, saponins, steroids, tannins. The presences of secondary metabolites in plant produce some biological activity in man and animals and is responsible for their use as herbs in ailments studied by **Sofowora A. (1986)**.

Similar result **Sharma et.al (2010)** reported that the qualitative chemical test of *Coleus forskohlii* root powder of ethanol extract demonstrated the presence of alkaloids, glycosides, carbohydrates, steroids, flavonoids, phenolic polyphenol, saponins and terpenoids and it imparts antibacterial activity.

Several reports were available on ethanol group various secondary metabolites present in this plant which exhibited high potential biological activities such as antioxidant, anti-inflammatory, antimicrobial, anticancer and anti-allergic reactions by **Anyasor et.al (2010)**.

Preliminary phytochemical analysis of the *Coleus* root extract revealed the presence of alkaloids, carbohydrates, glycosides, proteins, amino acids, flavonoids, tannins, phenolic compounds and terpenoids were reported by **Baskaran et.al (2011)**.

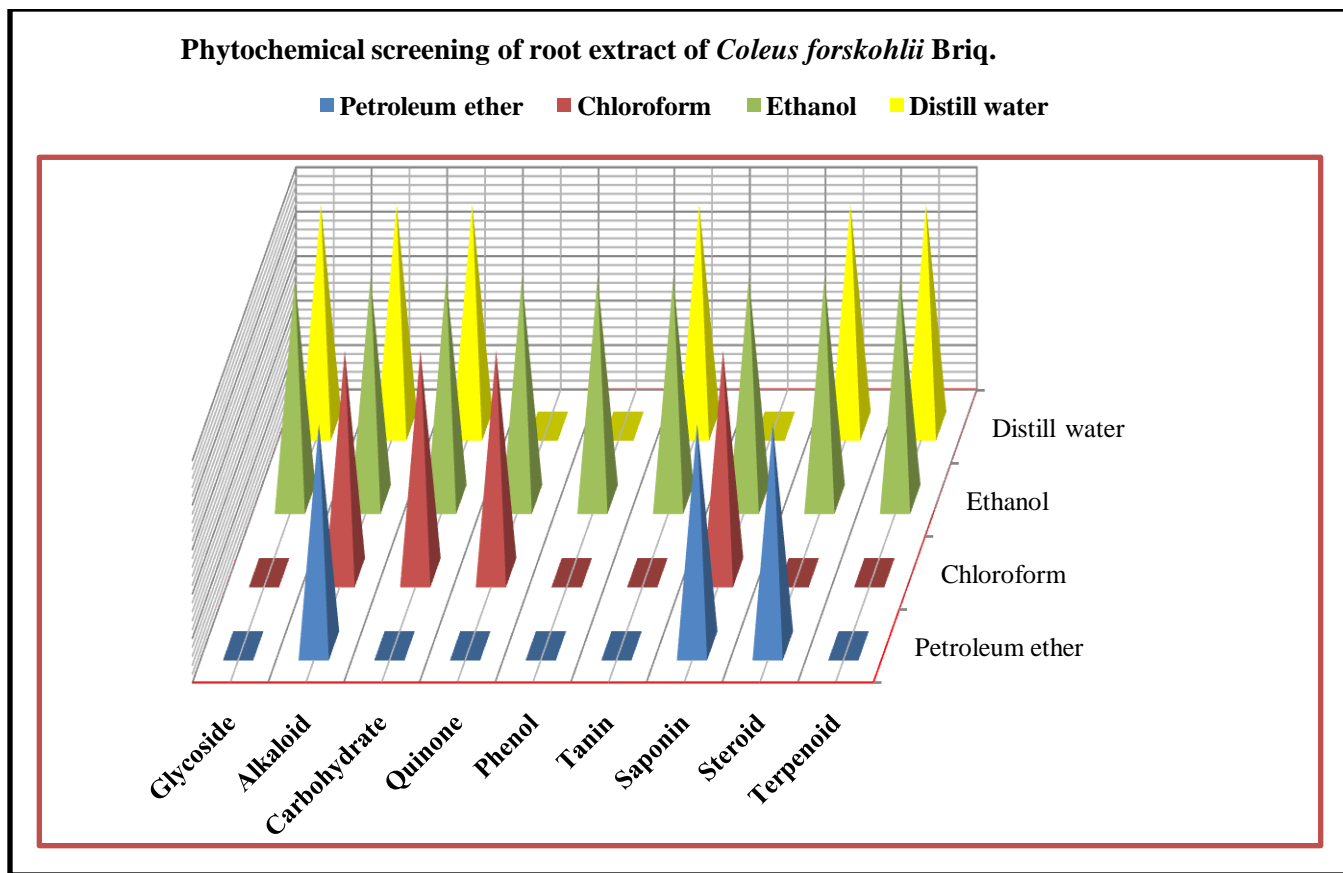
Protein concentrations was higher in the ethanol extracts of *Leucas linifolia* and *Coleus aromaticus* **Rai et.al (2013)**.

Table 1: Preliminary Phytochemical screening of different extracts (Petroleum ether, Chloroform, Ethanol, distil water) of *Coleus forskohlii* root:

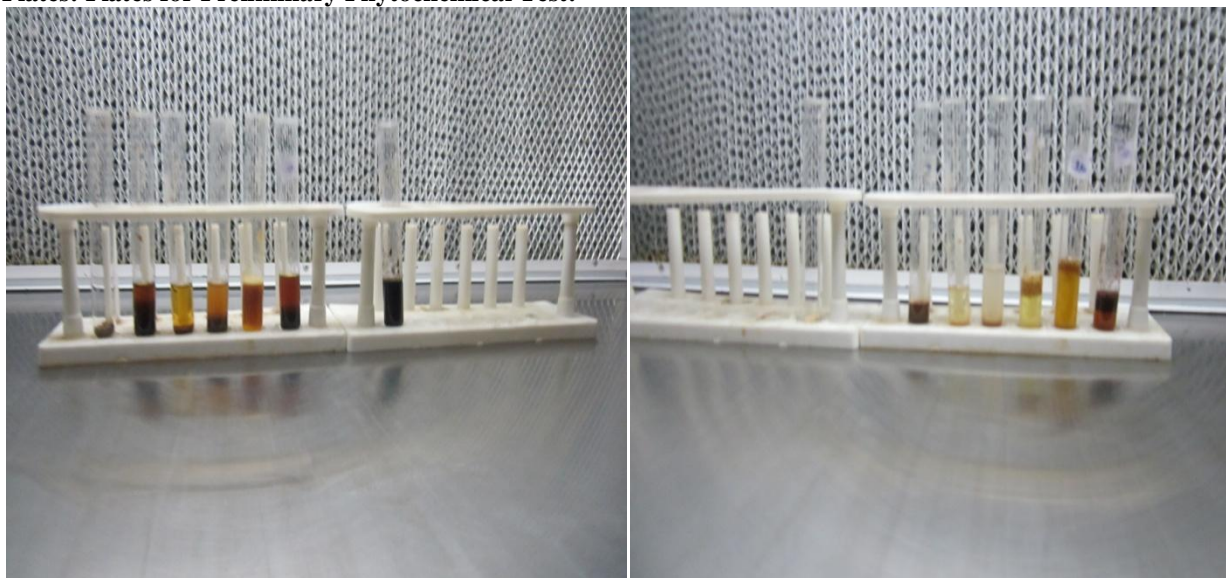
Chemical test	Petroleum ether	Chloroform	Ethanol	Distil water
Alkaloid	+	-	+	+
Glycoside	+	+	+	+
Carbohydrate	-	+	+	+
Quinone	-	+	+	-
Phenol	-	-	+	-
Tannin	-	-	+	+
Saponin	+	+	+	-
Steroid	+	-	+	+
Terpenoid	-	-	+	+

+ indicate the presence of constituents and —indicate the absence of constituents

Graph: Phytochemical screening of root extract of *Coleus forskohlii* Briq.



Plates: Plates for Preliminary Phytochemical Test:



Conclusion:

The present study revealed that the phytochemical screening on qualitative analysis showed that the ethanol extracts are rich in alkaloid, phenols, tannins, saponins, carbohydrate, glycoside, terpenoids, quinone, steroid and flavonoids are known phytochemical constituents. They can be used in the pharmaceutical industries for producing a potent drug against various diseases and disorders. The result of the study gives a basis of its use in traditional medicine to

manage ailments and disorders. It also contains some biologically active constituents worthy of further investigations.

Reference:

- Aida, P., Rosa, V., Blamea, F., Tomas, A., Salvador, C. (2001).**Paraguyan plants used in traditional medicine.Shortcommunicaton, J Ethnopharm, 16:93-98.
- Ammon, H.P and Kemper, F.H (1982).** Ayurveda: 3000 years of Indian traditional medicine.Med. Welt. 33:148-153.
- Ammon, H.P and Muller, A.B (1985).**Forskolin: from an Ayurvedic remedy to a modern agent. Planta. Med. 6:473-477.
- Anbuselvan S.AndMuralikrishnanV. (2013).**Antimicrobial activity of *Coleus forskohlii*root extract against human pathogens.International Journal of Phytopharmacology.4(1): 42-49.
- Anyasor, G.N., Ogunwenmo, K.O., Oyelana, O.A., Akpofunure, B.E.(2010).** Phytochemical constituents and antioxidant activities of aqueous and methanol stem extracts of *Costus after Ker Gawl* (Costaceae). African Journal of Biotechnology 9(31): 4880-4884
- Baskaran, C., Rathabaia,V., Sivamani, P. and Thiagarajan, V. (2011).** Antimicrobial activity of various root extracts of *Coleus forskohlii*. INT J CURR SCI, 1: 78-84.
- Chopra, R.N., Nayar, S.L., Chopra, I. C (1956).** The Glossary of Indian Medicinal Plants, CSIR, New Delhi, 74.
- Cowan,M.M., (1999).**Plant products as antimicrobial agents.ClinMicrobiol Rev. 12:564– 582.
- Doughari, J.H. (2006).** Antimicrobial activity of *Tamarindusindica*Linn, Trop J Pharm Res. 5 (2):597-60.
- Felix, R., Nirmal Kumar, N., Leon Stephan Raj T (2009).**Pharmacognostical Study of *Dioscoreaoppositifolia*L. Ethnobotanical Leaflets, 13: 77-82.
- Gupta, A.K., Ahirwar, N.K., Shinde, N., Choudhary, M., Rajput, Y.S., Singh, A. (2013).**Phytochemical screening and antimicrobial assessment of leaves of *Adhatodavasica*,*Azadirachtaindica* and *Daturastramonium*.UK Journal of Pharmaceutical and Biosciences. 1(1): 42-47.
- Harbone, J. B. (1984).** Phytochemical Methods: A guide to modern techniques of plant analysis. London: Chapman and Hall Ltd.
- Harbone, J.B. (1973),Sai Ramesh, A., Godwin Christopher, J., Setty, C.R., Thankamani, V. (2010).** Comparative study on the yield ratio and bioactive compounds of *Terminaliaarjuna* bark and core-wood, Journal of Pharmacy Research.3(6):1420-1422.
- Kenwat, R., Prasad, P., Sahu, R.K., Roy, A, Saraf, S. (2014).** Preliminary phytochemical screening and *in vitro* antioxidant efficacy of fruit oil of *Martyniaannua*. UK Journal of Pharmaceutical and Biosciences. 2(1): 16-22.
- Khare, R.S., Banerjee, S., Kundu, K (2011).***Coleus aromatics*Benth - A nutritive medicinal plant of potential therapeutic value.International Journal of Pharma and Bio Sciences, 2: 488-500.
- Manohar, P., Rajesham, V.V., Ramesh, M., Kiran Kumar, S., Prasanna, J.K (2011).**Pharmacognostical, Phytochemical and antimicrobial activity of *Bauhinia racemes* leaves.Journal of pharmaceutical biology. 1: 10-14.
- Onayade, O.A., Scheffer, J.J.C., Svendsen, A.B. (1990).** The importance of phytotherapy and screening of plants used medicinally in Africa.PlantaMedica, 56: 503-504.
- Palani, S., Raja, S., Naresh, R. and Kumar, B.S (2010).** Evaluation of nephroprotective, diuretic and antioxidant activities of *Plectranthusamboinicus* on acetaminophen-induced nephrotoxic rats.ToxicolMech Methods, 20(4): 213-21.
- Pelczar, M.J., Chan, E.C.S., Krieg, N.R. (1995).**Screening of selected medicinal plants of Nepal for antimicrobial activities.J. Ethnopharmacol. 546: 153-159.
- Prasad, S., Naik, P., Vijayalaxmi, K.K (2002).** Efficiency of *Coleus aromatics* extract in modifying cyclophosphamide and mitomycin-C clastogenicity in mouse bone marrow cells.Indian J. of Exp. Biol, 40:1020-1025.
- Prudent, D., Perineau, F., Bessler, J.M., Michael, G.M., Baccou, J.C. (1995).**Analysis of the essential oil of wild *Oregans* from Martinique (*Coleus aromaticus*Benth) evaluation of itsbacteriostatic and fungistatic properties. J. Esst oil Res, 7:165– 173.
- PurohitPrasanna, Thakur BaisRitu, Singh Pratibha, Sugufta Khan (2014).** Assessment of antibacterial activity and phytochemical screening of *Hemidescusindicus* root extracts.UK journal of pharmaceutical and Bioscience. 2(6):67-72.

- R.K. Baslas and P. Kumar (1981).**Chemical examination of essential oil of *Coleus aromatics*Benth.Journal of Indian Chem. Soc. 58(1): 103-04.
- Rout, O. P., Acharya, R., Mishra, S.K. (2012).**Pathorchur (*Coleus aromaticus*): A Review of the medicinal evidence for its phytochemistry and pharmacology properties. International Journal of Applied Biology and Pharmaceutical Technology, 3: 348-355.
- Senthilkumar,C. S., Suresh Kumar M. &RajasekaraPandianM. (2010).***In vitro* antibacterial activity of crude leaf extracts from *Tecomastans* (l) juss. Etkunth, *Coleusforskohlii* and *Pogostemonpatchoul* against human pathogenic bacteria. International journal of pharm tech research, 2(1): 438-442.
- Sharma, U., Sahu, R.K., Roy, A., Golwala, D.K. (2010).** *In vivo*antidiabetic and antioxi-dant potential of *Stephaniahernandifolia* in streptozotocin-induced-diabetic rats.Journal of young pharmacists. 2(3): 255-260.
- Sofowora A., John Wiley Chiechester; (1986).**Medicinal plant and traditional medicine in Africa II: 178.
- Trease, G.E., Evans, W.C. (1989).**Pharmacognosy, BailliereTindall, London.13th edition, 176- 180.
- Uphof, J. C. Th. (1959).**Dictionary of Economic Plants 191.Codicote: Wheldon and Whesley.
- Vaishali Rai, M., VinithaRamanathPai, Pratap Chandra Kedilaya H., Smitha Hegde (2013).** Preliminary Phytochemical Screening of Members of Lamiaceae Family: *Leucaslinifolia*,*Coleus aromaticus* and *Pogestemon patchouli*.Int. J. Pharm. Sci. Rev. Res., 21(1), Jul – Aug 2013; n° 22, 131-137.