OLIVE LIFESCIENCES PVT LTD

Improving lives

A Revolution in Weight Management

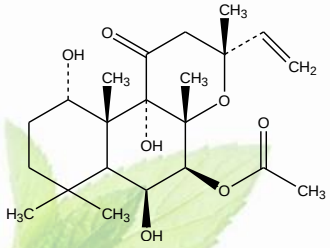
Forskolin from *Coleus Forskholii*

General description:

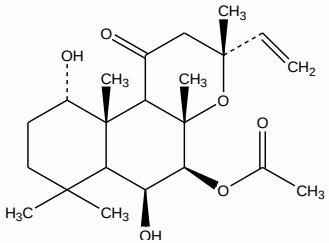
Botanical name	: *Coleus forskohlii* Briq.
Family	: Lamiaceae
Common Name	: Coleus
Part used	: Root

Phytochemistry

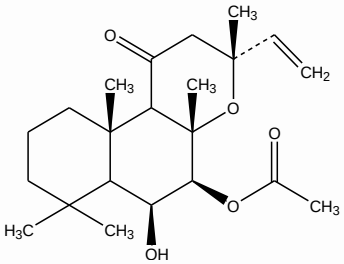
Coleus is rich source of secondary metabolites such as terpenoids, alkaloids and isoflavanoids.[1,2] Forskolin the major diterpenoid, is known worldwide as fat burning molecule. Forskolin is upregulate cyclic 3′,5′-adenosine monophosphate (cAMP) concentration.[3] Root extracts contain other diterpenoids viz., 9-deoxyforskolin, 1, 9-dideoxyforskolin, 1,9 dideoxy-7-deacetylforskolin, 7-deacetyl-1-deoxyforskolin, forskolin I, forskolin J and forskolin L etc.[4]



Forskolin



9-deoxyforskolin



1,9-dideoxyforskolin

OLIVE LIFESCIENCES PVT LTD
Improving lives

Traditional Wisdom on Weight Management

Coleus forskohlii has a rich diversity of ethnopharmacological applications including weight management, heart ailments and hypotension. Coleus is known to be used as a condiment in some part of India. Forskolin and its derivatives inhibits platelet aggregation, mast cell degranulation, relaxes arteries, regulates insulin secretion and thyroid function, decrease adipose accumulation, reduce body weight and stimulates digestive enzymes secretion. It is used in skin care, treatment of cardiovascular and respiratory diseases etc.[5] Dr. Shivaprasad (2014) from R&D Centre, Olive Lifesciences Pvt. Ltd. reported that administration of coleus extract significantly decreased food intake and weight gain associated with cafeteria diet.[6] . Dr. Shivaprasad (2014) also reported that *Coleus forskohlii* forskolin, 1-deoxyforskolin, and 1, 9-dideoxyforskolin did not involve in CYP450 induction based drug interaction.

OLIVE LIFESCIENCES PVT LTD
Improving lives

Forskolin - The Fat Burning Molecule

- Forskolin directly, rapidly and reversibly activate adenylate cyclase, resulting remarkably increases the intracellular cAMP level. cAMP increases utilization of body fat, increases basal metabolic rate, and regulates the body's thermogenic response to food. Thus forskolin supplement may lead to fat loss without muscle mass loss (Alasbahi and Melzig; 2010. Planta Med. 76: 753–765)

- Topical cosmetic slimming product combining forskolin, tetrahydroxypropyl ethylenediamine, caffeine, carnitine and retinol have been developed. Clinical trial on five selected parts of the body was conducted among 78 women. The formulation improved skin feature and significantly reduced fat in circumference of abdomen, hips-buttocks and waist (Roure et al. 2011; Int J Cosmet Sci. 33(6):519-26)

Anti-obesity activity and weight management

- Crude extracts of *Coleus forskohlii* and its phytoconstituents have been reported for potential therapeutic effects on weight management and obesity (Shivaprasad et al. 2014, Phcog Res 6:42-45).
- Effects on appetite by *Coleus forskohlii* supplement in mildly overweight women were evaluated. Significant reduction in the satisfaction of food consumed in treated group, suggesting that there was less enjoyment in eating and therefore intensity of food consumption was less (Henderson et al. 2005; J Int Soc Sports Nutr 2:54–62).
- 250 mg of standardized *Coleus forskohlii* extract containing 10% forskolin was administered to 6 overweight women twice daily for eight weeks. 8% reduction of body fat was observed and average weight was reduced (Monograph on Coleus forskohlii (2006) Altern Med Rev 11:47-51)

Cardio protective activity

- Coleus was used in ancient Ayurvedic medicine for the treatment of heart diseases. Its predominant effect has to lower the blood pressure of the hypertensive rats due to relaxation of the vascular smooth muscles. It has positive inotropic effect on isolated rabbit's as well as on cat's heart (Dubey et al. 1981. . J Ethnopharmacol 3:1-13).
- Forskolin dose-dependently reduced cardiac pre and after load values, and led to a reduction in systolic, diastolic, and mean pulmonary artery pressure as well as pulmonary wedge pressure; with an increase in cardiac output (Baumann et al. 1990; J Cardiovasc Pharm 16:93-100).
- Study has been conducted with 30 patients of congestive heart failure. Results revealed that forskolin improved both systolic and diastolic function (Lele 2010; J Ayurveda Integr Med 1:257–265).

Antihypertensive activity

- Forskolin has been reported to possess blood pressure lowering activity via relaxing of vascular smooth muscles. It increases cerebral blood flow which may be beneficial in cerebral vascular insufficiency and enhance post-stroke recovery (Patel MB. 2010. East Cent Afr J Pharm Sci 13:25- 32).
- *Coleus forskohlii* powder tablets were prepared and studied for hypotensive effect among 49 patients within age of 50-80 years. Results indicated that the formulation have significant antihypertensive activity (Jagtap et al. 2011, Ayu 32:59-65).
- Alasbahi and Melzig (2010) reported that receptor independent mechanism of action of forskolin has been useful for the treatment of several hypertensive and heart failure patients (Planta Med. 76: 753–765)

Our Strength

- Contract Cultivation of Coleus over 15000 acres of land
- Traceability from farmer to finished products
- Stringent Quality checks throughout the process

Coleus forskohlii root

Dry

Palatalization

Extraction

Concentration

Purification

Drying & Formulation

OLIVE LIFESCIENCES PVT LTD
Improving lives

Product range

- Standardized Coleus forskohlii extract 10%
- Standardized Coleus forskohlii extract 20%
- Standardized Coleus forskohlii extract 40 %

Document Support

- Specification
- Certificate of Analysis
- Material Safety Data Sheet
- Technical Document
- Assay Chromatogram
- Non-GMO Declaration

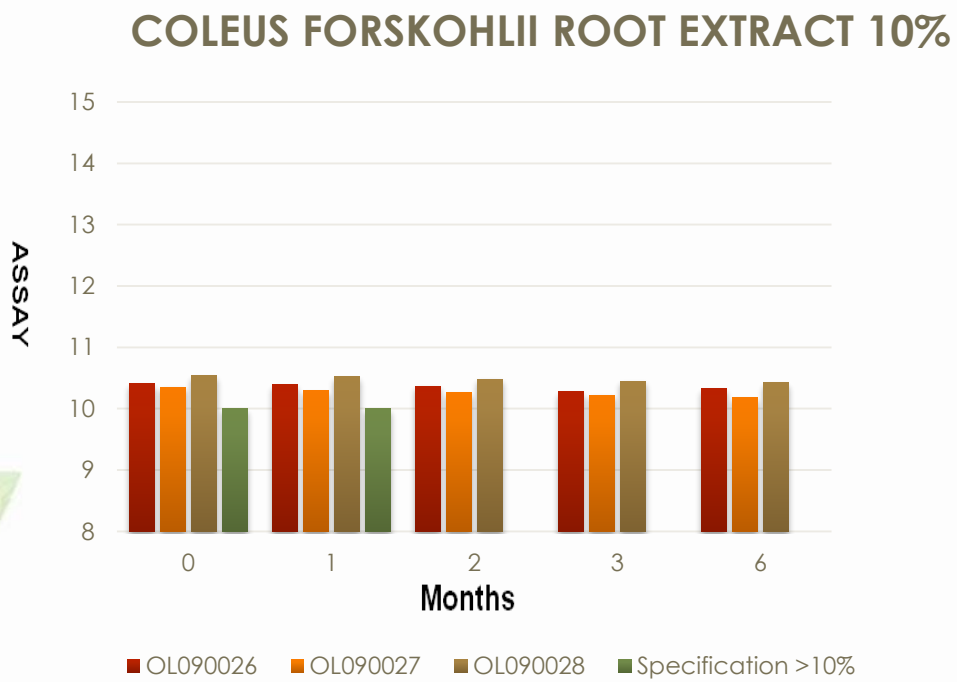
Stability Study

Stored in a stability chambers

Accelerated conditions : **40ºC ± 2 ºC / 75% ± 5% RH**

Real time conditions : **25ºC ± 2 ºC / 60% ± 5% RH**

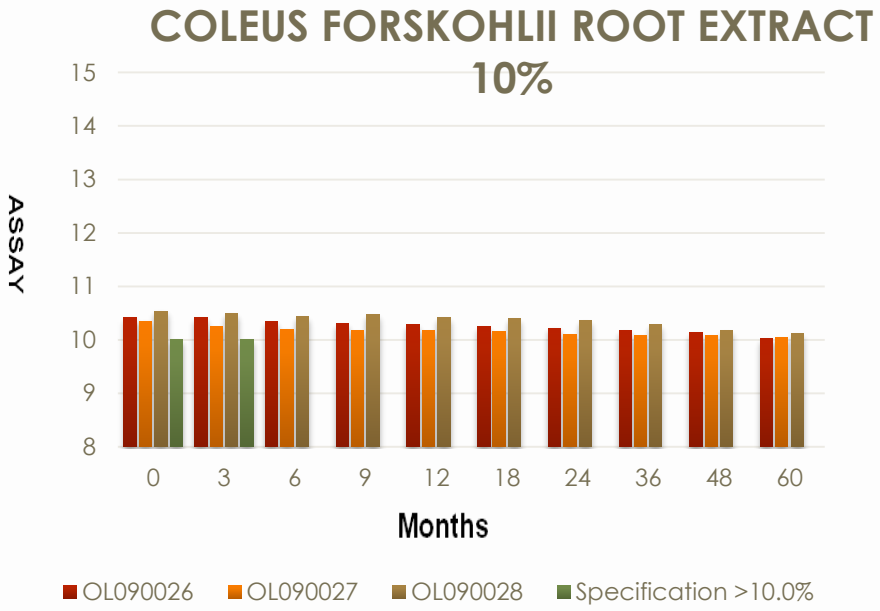
Stability chamber was monitored for temperature and humidity



Accelerated stability study

OLIVE LIFESCIENCES PVT LTD
Improving lives

Real time stability study



The *Coleus forskohlii* root extract 10% is stable under accelerated stability conditions for a period of six months and for Sixty months in real time condition. It is concluded that, shelf life of *Coleus forskohlii* root extract 10% is **5 years**.

OLIVE LIFESCIENCES PVT LTD
Improving lives

Safety of *Coleus forskohlii*

- Traditionally root is being used for the preparation of pickles in India (Jagtap et al. 2011. Ayu. 32(1): 59–65).
- In Yemen, its leave is being cooked as vegetable (Paul et al. 2013. Hygeia.J.D.Med.vol.5 (1) 69-78).
- The plant is being used as a spice in Thailand and other parts of the South East Asia (Sunitha et al. 2013. Int J Pharm Bio Sci; 4(3): (B) 1139 - 1149).
- Kapewangolo et al. (2013) reported that coleus was widely used in African countries as a home remedy and very less cytotoxic. This low cytotoxicity claims its vast use in treating various ailments (J Ethnopharmacol.149(1):184-90).
- In a double blind and randomized manner, 23 females supplemented their diet with 500 mg of *C. forskohlii* daily for 3 months. There were no significant changes was observed to 14 major blood chemistry markers and there was no clinically significant side effect (Henderson et al., 2005, Journal of the international society of sports nutrition, 2(2):54-62)

Recommended dosage

Coleus is being use traditionally as food ingredient and safe to consume.[8]

A typical dose is 50 mg (9 mg forskolin) standardized product (18%) forskolin; 2-3 times a day. Instead of consuming 6-12 grams of dried *C. forskohlii* roots per day, it is better to stick with forskolin standardized supplement.

This supplement showed synergistic effect with various helper phytochemicals that improve forskolin's efficacy and absorption than its pure form.

Research publications

Orient Pharm Exp Med
DOI 10.1007/s13596-014-0169-z

REVIEW

Ethnopharmacological and phytomedical knowledge of *Coleus forskohlii*: An approach towards its safety and therapeutic value

H. N. Shivaprasad · Subrata Pandit · M. Bhanumathy · D. Manohar · Vishal Jain · Shariq Afsar Thandu · Xiao Su

Received: 28 March 2014 / Accepted: 15 September 2014

Abstract *Coleus forskohlii* Briq. (Family: Lamiaceae) is a fleshy perennial aromatic herb with fibrous roots that grows under tropical to temperate areas in India, Burma, Thailand, Nepal, Pakistan, Sri Lanka, East Africa and Brazil. The root-stock of the plant is used in Ayurveda and other systems of

phytomedical information of *C. forskohlii* approaching towards its safety and therapeutic perspective.

Keywords *Coleus forskohlii* · Ayurveda · Phytoconstituents · Forskolin · Ethnopharmacology · Safety

Journal of Traditional and Complementary Medicine xxx (2014) 1–4

Contents lists available at ScienceDirect

Journal of Traditional and Complementary Medicine

journal homepage: http://www.elsevier.com/locate/jtcme

Short communication

Effect of *Coleus forskohlii* and its major constituents on cytochrome P450 induction

Shivaprasad Hebbani Nagarajappa [a], Subrata Pandit [a,*], Manohar Divanji [a], Bhanumathy Mariyanna [a], Pavan Kumar [b], Ashok Godavarthi [b]

[a] Research and Development Centre, Olive Lifesciences Pvt. Ltd., Anthrasanahalli, Tumkur, Karnataka, India
[b] Radiant Research Services Pvt. Ltd., Srinagar, Bangalore, India

ARTICLE INFO

Article history:
Received 17 June 2014
Received in revised form
2 July 2014
Accepted 13 August 2014
Available online xxx

Keywords:
Coleus forskohlii
Cytochrome P450
Drug interaction
mRNA expression
Standardization

ABSTRACT

Coleus forskohlii Briq. has been used traditionally for the treatment of several ailments since antiquity in Ayurveda. In the present study, an approach has been made to evaluate the effect of *C. forskohlii* and its major constituents on cytochrome P450 (CYP3A, CYP2B, and CYP2C) mRNA expression in rat hepatocytes. To gain better understanding of the herb–drug interaction potential of the chemical constituents present in *C. forskohlii*, the extract was subjected to column chromatography followed by standardization with respect to forskolin, 1-deoxyforskolin, and 1,9-dideoxyforskolin using reversed-phase high-performance liquid chromatography (RP-HPLC). Hepatocytes were treated with extracts, fractions, and phytoconstituents, followed by extraction and purification of total mRNA. Study of mRNA expression was carried out through reverse transcription polymerase chain reaction, followed by agarose gel electrophoresis. Results revealed that the test substances did not show any significant mRNA expression compared to the control against CYP3A, CYP2B, and CYP2C. Positive controls such as dexamethasone and rifampin showed significantly high ($p < 0.001$) induction potential compared to the control. It can be concluded that *C. forskohlii* and its major constituents may not be involved in CYP450 induction-based

OLIVE LIFESCIENCES PVT LTD
Improving lives

References

Jagtap et al. 2011. Clinical efficacy of *Coleus forskohlii* (Willd.) Briq. (Makandi) in hypertension of geriatric population. Ayu. 32:59-65

Uma Maheswari et al. 2011. Hairy root culture of an important medicinal plant: *Coleus forskohlii*. Int J of Agri Sci 3:82-89

Yokotani et al. 2013. Influence of dietary macronutrients on induction of hepatic drug metabolizing enzymes by *Coleus forskohlii* extract in mice. J Nutr Sci Vitaminol. 59:37-44

Alasbahi & Melzig 2010. *Plectranthus barbatus*: A review of phytochemistry, ethnobotanical uses and pharmacology – part 1. Planta Med. 76: 653–661

Murugesan et al. 2012. Bioactivity of root hexane extract of *Coleus forskohlii* Briq. Labiatae : GC/MS/MS Characterization and identification. Eur J Exp Biol. 2:1469-1473

Shivaprasad et al. 2014. Effect of *Coleus forskohlii* extract on cafeteria diet-induced obesity in rats. Phcog Res 6:42-45

Shivaprasad H N. Subrata Pandit, M. Bhanumathy, D. Manohar, Pavan Kumar B, Ashok Godavarthi. 2014. Effect of *Coleus forskohlii* and its Major Constituents on Cytochrome P450 Induction. J of Trad and Complementary Med. [In press].

Shivaprasad H N. Subrata Pandit, M. Bhanumathy, D. Manohar, Vishal Jain, Shariq Afsar Thandu, Xiao Su. 2014. Ethnopharmacological and Phytomedical Knowledge of *Coleus forskohlii*: An Approach Towards its Safety and Therapeutic Value. Oriental Pharmacy and Experimental Medicine. [In Press]

OLIVE LIFESCIENCES PVT LTD

Improving lives

OLIVE LIFESCIENCES PVT LTD
Improving lives

Olive Lifesciences Pvt. Ltd.
2203, Pragathi 16th D Cross 8th Main
Sahakar Nagar, Bangalore -560 092
Phone: +91-80-27724235
Fax : +91-80-42113536

info@olivelifesciences.com

www.olivelifesciences.com

Get connected
https://youtu.be/3zR_fO8ZDc4
www.facebook.com/olivelifesciences.com