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Preliminary phytochemical investigation on *Secamone emetica* (Retz.) R.Br. (Apocynaceae) – An endemic medicinal plant species of southern India

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Abstract
Secamone emetica is used as traditional and folklore medicines for treating various diseases like leucorrhea, dysentery, fever and headache. In the present investigation carried out the preliminary screening of phytochemicals from various parts of the plant with different solvent extracts. The study revealed that the presence of various secondary metabolites such as alkaloids, flavonoids, phenols, terpenoids, tannins, glycosides and these components may have supported the medicinal properties of the plant species.

Keywords: Secamone emetica, endemic medicinal plant, phytochemicals, alkaloids, flavonoids.

1. Introduction
Secamone R.Br. is a pantropical genus distributed in Africa, from Asia to Australia about 162 species. In Asia, it occurs in Sri Lanka and southern India with about 100 species [1]. *Secamone emetica* is a native plant of southern India commonly found in foot hills and scrub forest areas of Andhra Pradesh to Tamilnadu up to 1200 m elevation. It is a slender branched climber with brown corky thick bark. Leaves and root part of the plant has been used for various traditional medicinal systems. It has been used in the local folklore system for treating various diseases like leucorrhea, dysentery, fever and headache. Root of this plant is acrid and is said to be emetic [2]. The plant is used to cure nervous disorders among Paliyan tribe community of Sirumalai hills in Tamilnadu [3].The plant is having milky latex in all over the body to have a number of secondary metabolites and high hydrocarbon content [4]. The fruits and leaves of the plant have possessed the antioxidant capacity due to the presence of secondary metabolites [5]. There are no phytochemical reports available so far this endemic medicinal plant species. Hence the present study aimed to carry out the preliminary phytochemical screening of various parts of *S. emetica*.

2. Materials and Methods
2.1 Collection, identification and preparation of plant material
Fresh leaves, stem bark and young fruits of *S. emetica* were collected from Kolli hills of Namakkal district, Tamilnadu (Fig.1). Preliminary identification was done with the help of local Floras [6, 7] and confirmation of the identification was compared with authentic specimen deposited in the Botanical Survey of India, Southern Circle, Coimbatore, Tamilnadu. The voucher specimen (Vayapuri & Raju, 307) is deposited in the herbarium of the Department of Botany, Kandasamy Kandar College, P. Velur, Namakkal district, Tamilnadu. The fresh plant parts separately air-dried, powered and then stored in dry sealed glass bottles until use.

2.2. Extraction of plant material
Plant powders were separately subjected to extraction with various solvents such as Ethanol, Chloroform, Hexane and water using Soxhlet's apparatus with continuous reflux for 8 hours at 70 ^{0}C temperature. Further extracts were distilled off and concentrate to a syrupy consistency and then evaporated to dryness. The dried extract were weighed and prepared the 1% sample solution with respective solvents.

2.3 Phytochemical screening
Preliminary qualitative phytochemical screening was carried out with the following methods.

Alkaloids: 2 ml of test solution added with 2 N hydrochloric acid, aqueous layer formed was decanted and to that added few drops of Mayer's reagent. The creamy precipitate obtained in the bottom indicates the presence of alkaloids [8].

Flavonoids: 2 ml of test solution, added alcohol and a bit of magnesium salt. Then a few drops of concentrated hydrochloric acid was added and boiled gently for 5 minutes [9].

Steriods: 1 ml of the extract was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by the sides of the test tube. The upper layer turns red and sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids [10].

Terpenoids: 2 ml of extract was added to 2 ml of acetic anhydride and concentration of H2SO4. Formation of blue, green rings indicates the presence of terpenoids [11].

Triterpenoids: 2 ml of test solution, added a piece of tin and 2 drops of thionyl chloride. The result was observed [11].

Tannins: 2 ml of extract was added to few drops of 1% lead acetate. A yellowish precipitate indicated the presence of tannins [12].

Saponins: 5 ml of extract was mixed with 20 ml of distilled water and then agitated in a graduated cylinder for 15 minutes. Formation of foam indicates the presence of saponins [13].

Phenols: 2 ml of aqueous extract is added to 2 ml of 2N Hcl and ammonia. The appearance of

Pink-red turns blue-violet indicates the presence of phenols [8].

Coumarins: 3 ml of 10% NaOH was added to 2 ml of aqueous extract formation of yellow colour indicates the presence of coumarins [8].

Glycosides: 5ml of diluted sulphuric acid was added in extracts in a test tube and boiled for fifteen minutes in a water bath. It was then cooled and neutralized with 20% potassium hydroxides solution. A mixture of 10ml of equal parts of Fehling's solution were added and boiled for five minutes. A more dense red precipitate indicates the presence of glycosides [8].

3. Results and Discussion

The present investigation on the preliminary phytochemical screening of *Secamone emetica* with various extracts of different parts summarized in table 1. Stem bark (Fig 1) and leaves are having more number of secondary metabolites such as alkaloids, flavonoids, phenols, terpenoids and glycosides. Steroids, saponins and coumarins are obtained negative results in this plant species. Fruit extracts showed the less number of secondary metabolites in all four kinds of extracts. Among the phytochemicals, alkaloids, flavonoids, phenols and glycosides are abundant in stem bark and leaves which are showing strong results in ethanol extracts. Terpenoids and triterpenoids are weakly present in hexane extracts of leaves and stem bark. Aqueous extracts showed the less number of metabolites and very weak results (Table 1). Ethanol is a good solvent system for extraction of secondary metabolites, the present result is also proved that many metabolites extracted and resulted in ethanol extracts. Chloroform extracts have shown a moderate number of phytochemicals from selected plant parts of *S. emetica*.

Fig 1: *Secamone emetica* (Retz.) R.Br. **a**. Plant with flowering; **b**. Plant with fruits; **c**. Corky stem bark

The medicinal value of the plant lies in some chemical substances that have a definite physiological action on the human body. The most important bioactive compounds of the plant are alkaloids, flavonoids, phenols and glycosides. The leaves and stem bark showed a good supply of useful compounds of alkaloids, flavonoids and glycosides. The strong presence of flavonoids in leaves and stem barks may have supported the antioxidant potential of the plant species. The antioxidant property of the plant extract was already carried out in Kerala[5]. African *Secamone* species of *S. afzelii* and *S. myrtifolia* are also claimed to be a very similar properties of Indian *Secamone emetica*. They also have potential antioxidant properties due to the presence of flavonoids, triterpenoids and caffeic acid [14].

The pharmacological activities of a given plant are associated with the type and nature of secondary metabolites present in them. The need for phytochemical screening has become imperative, since many plants accumulate biologically active substances in various parts and tissues. Phytochemical screening of *S. emetica* revealed the possible presence of alkaloids, flavonoids and glycosides. Typical alkaloids often have marked pharmacological effects, when administered to man and other animals. The plant has potential source of flavonoids and glycosides would be chance of exploration of anti-inflammatory and antioxidant properties.

The plant species studied here can be used as a potential source of useful drugs. It also justifies the folklore medicinal use and the claims about the therapeutic values of this plant as a curative agent. Therefore, further study needed for isolation, identification, purification, characterization, and structural elucidation of bioactive compounds of *S. emetica* that wound be obtained with pharmacological and clinical trials, the compounds leads a promising therapeutic agent.

Table 1: Qualitative phytochemical screening of different parts of *Secamone emetica* with various solvent extracts (+++ abundant; ++ moderately present: + weakly present; ---- absent)

Phytochemical	Solvent extracts			
(Plant parts)	Ethanol	Chloroform	Hexane	Aqueous
Leaves				
Alkaloids	+++	+	----	+
Flavonoids	++	--	----	----
Phenols	+++	++	----	+
Steroids	----	----	----	----
Terpenoids	+	----	+	----
Triterpenoids	----	----	+	----
Tannins	+	+	----	----
Saponins	----	----	----	----
Coumarins	----	----	----	----
Glycosides	+++	++	+	+
Stem bark				
Alkaloids	+++	++	----	+
Flavonoids	+++	+	----	----
Phenols	++	+	----	+
Steroids	+	----	----	----
Terpenoids	----	----	++	----
Triterpenoids	----	----	+	----
Tannins	++	+	----	+
Saponins	----	----	----	----
Coumarins	----	----	----	----
Glycosides	+++	+++	+	+
Young fruits				
Alkaloids	++	+	----	----
Flavonoids	+	+	----	----
Phenols	+	----	----	+
Steroids	+	----	----	----
Terpenoids	----	----	+	----
Triterpenoids	----	----	+	----
Tannins	+	----	----	----
Saponins	----	----	----	----
Coumarins	----	----	----	----
Glycosides	++	+	----	+

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