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# Phytochemical analysis of the flower extracts of *Rhododendron arboreum* Sm. ssp. *nilagiricum* (Zenker) Tagg

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## ABSTRACT

**Objective:** To evaluate the preliminary phytochemical screening of the flower extracts of *Rhododendron arboreum* (*R. arboreum*) Sm. ssp. *nilagiricum* (Zenker) Tagg. **Methods:** The preliminary phytochemical screening was performed by the standard methods as described by Harborne. **Results:** The phytochemical analysis carried out on the flowers of *R. arboreum* Sm. ssp. *nilagiricum* (Zenker) Tagg showed the presence of phenols, saponins, steroids, tannin, xanthoprotein and coumarin. **Conclusions:** The present study suggested that the flower extracts of *R. arboreum* Sm. ssp. *nilagiricum* (Zenker) Tagg possess significant phytochemical constituents and it can be used as antimicrobial agents against clinically isolated pathogens.

## 1. Introduction

Plants used in traditional medicine contain a wide range of bioactive compounds that can be used to treat infectious diseases[1–5]. The most important of these bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic[6–10]. *Rhododendron arboreum* (*R. arboreum*) Sm. ssp. *nilagiricum* (Zenker) Tagg (Ericaceae), a tree species endemic to the southern Western Ghats of peninsular India, has ecological significance and economic importance in addition to its graceful flowers[11,12]. The beautiful, magnificent flowers and evergreen foliage of *Rhododendrons* have attracted the attention of botanists and horticultural enthusiasts throughout the world. The flowers of the species of *Rhododendron* are considered sacred and offered in temples and monasteries[13]. Apart from aesthetic and sacred values, *Rhododendrons* also have medicinal and economic values. The dried flowers of *R. arboreum* are supposedly highly efficacious in checking diarrhoea and blood dysentery[14]. The fresh and dried corolla that is acid-sweet in nature is given when fish bones get struck

in the gullet[15]. The flowers of *R. arboreum* are used for brewing local wine to prevent high-altitude sickness in the Darjeeling hills of eastern Himalayas. The young leaves are said to be poisonous as well as medicinal and applied on the forehead to alleviate headache[16]. Squash is also prepared from the flowers of *R. arboreum*. The grained wood of *R. arboreum* is used for making 'khukri' handles, pack-saddles, gift-boxes, gunstocks and posts[12].

Chemical analysis of the leaves of *R. arboreum* var. *nilagiricum* revealed the presence of hyperoside (3-D – galactoside of quercetin), ursolic acid and epifriedelinol, a triterpenoid compound[17]; Quercetin–3–rhamnoside a crystalline chemical compound have been reported from the flowers of this species[18]. Recently Swaroop *et al*[19] reported three biologically active phenolic compounds *i.e.* quercetin, rutin and coumaric acid in flowers of *R. arboreum* using high-performance thin-layer chromatography (HPTLC). However, there is no reference in the published literature to phytochemical work pertaining secondary metabolites on the flowers of *R. arboreum* var. *nilagiricum*. The result of the phytochemical examination of the flowers of this plant is described in this communication.

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## 2. Collection and identification of plant material

*R. arboreum* var. *nilagiricum* was collected from Palni Hills of Western Ghats. The taxonomical identification of the species was confirmed by the Department of Botany, Nesamony Memorial Christian College, Marthandam.

### 3. Preparation of flower extracts and phytochemical screening

5 g of fresh flowers petals was kept in closed conical flask with 20 mL of solvents (acetone, benzene, chloroform, ethanol, petroleum ether and distilled water) separately in a shaker at room temperature for 24 h. After incubation, the extracts were filtered through Whatman No. 41 filter paper and the extracts were collected and stored in the refrigerator at 4 °C. The flower extracts were concentrated using vacuum evaporator and dried.

All the extracts were subjected to preliminary phytochemical screening as per the methods given by Harborne[20].

### 4. Results

The presence of various phytochemical constituents in different extracts is reported in Table 1.

A total of 6 different types of extracts were prepared to test the availability of 12 biochemical compounds (6×12 = 72),

evident in all extracts.

### 5. Conclusion

Since ancient times, plants have been used to cure various ailments caused by microorganisms[21–26]. Moreover, the potential of higher plants as a source for new drugs is still largely unexplored. There is an abundant medicinal plants throughout the world but only small amounts are investigated for its biological activity[27–29]. Nevertheless, today there is a wide range of medicinal plant parts which include the flowers, leaves, stem, fruits and root extracts are used as powerful raw drugs possessing a variety of antimicrobial and healing properties. The phytochemical screening of the flowers of *R. arboreum* var. *nilagiricum* showed the presence of secondary metabolites including phenols, saponins, tannins and coumarins which has great medicinal properties. In addition, there are several reports to show *Rhododendron* species for having potent antimicrobial chemicals[30–32]. Moreover, several species of *Rhododendron* has been widely used as main ingredient in traditional medicine. Hence, the presently studied *R. arboreum* var. *nilagiricum* flower extract could be of considerable interest to the development of new life saving drugs. However, further research is required to isolate the bioactive principle of this plant as well as further studies on its bioefficacy

**Table 1**

Results of preliminary phytochemical screening.

Phytochemical constituents	Acetone	Benzene	Chloroform	Ethanol	Petroleum Ether	H <sub>2</sub> O
Alkaloids	–	–	–	–	–	–
Phenol	+++	++	+	+++	+	++
Flavonoids	–	–	–	–	–	–
Saponins	–	+++	+++	–	+++	–
Protein	–	–	+	+	–	–
Quinone	–	–	–	–	–	–
Steroids	–	+	–	+++	–	–
Tannin	+++	–	–	+++	–	+++
Xanthoprotein	+++	–	–	–	–	–
Carboxylic acid	–	–	–	–	–	–
Coumarins	+++	–	+	–	+	–
Carbohydrates	–	+	+++	+	+	–
Number of chemical compound in each extracts	4	4	5	5	4	2

(–) absent; (+) low; (++) average; (+++) high.

of which 24 gave positive results and the remaining 48 gave negative results. Phytochemical screening of the present study revealed the presence of phenolic compounds, saponins, proteins, steroids, tannins, xanthoproteins, coumarins and carbohydrates, while it gave the negative results to alkaloids, flavonoids, quinone and carboxylic acids. Chloroform and ethanol extract shows the presence of 5 compounds each, followed by acetone, benzene and petroleum ether had 4 compounds each, while water showed the presence of 2 compounds (phenolic compound and tannins). However, the presence of phenolic compounds is

against human pathogens.

### Conflict of interest statement

We declare that we have no conflict of interest.

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