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Survey of Phytochemical Diversity of Secondary Metabolism in Selected Wild Medicinal Plants

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Abstract

A phytochemical screening of alkaloids, triterpenes saponins and tannin was carried out the selected medicinal plant parts of leaf, barks, rhizome and fruit samples from 63 plant species representing 26 genera and 25 families. The positive results of phytochemical diversity of bioactive constituents were alkaloids (58.73%), terpenoids (92.06%), flavonoids (90.48%), saponins (50.79) and tannins (31.74%) present in total of sixty three plant species.

Keywords: Plants, phytochemical; Tirunelveli Hills; alkaloids; flavonoids.

Introduction

Natural products once served humankind as the source of all drugs, and higher plants provided most of these therapeutic agents. Today, natural products (and their derivatives and analogs) still represent over 50% of all drugs in clinical use, with higher plant-derived natural products representing *ca*. 25% of the total [1]. The World Health Organization estimates that 80% of the people in developing countries of the world rely on traditional medicine for their primary health care, and about 85% of traditional medicine involves the use of plant extracts. This means that about 3.5 to 4 billion people in the world rely on plants as sources of drugs [2]. More than 80 % of the world's populations depend on traditional plant-derived medicines for their health needs. The use of plants for medicinal purposes represents the largest use of biodiversity in the world. Many more species of plants are used as medicines, for example, than are used for food. Focusing on medicinal plants, therefore, has the potential for involving people more widely in conservation issues.

Conservative estimates suggest that there are more than 250,000 species of higher plants existing on this planet, and only a very small percentage of plants have been exhaustively studied for their potential value as a source of drugs. Obviously natural products will continue to be extremely important as sources of medicinal agents. Discovery of new drugs from plants requires the screening of many thousands of plant extracts, and thus requires continued access to the vast plant biodiversity of the Earth, much of which is located in tropical rain forests. Tropical forests cover only 7% of Earth surface, but they are thought to contain at least one half of all plant species. In these forests, deforestation is proceeding at a rate of 20 million ha/year, resulting in the loss of species at rates estimated to be 100 to 1000 times greater than background extinction. Therefore, the main objectives of this study to identify in the phytochemicals constituents of wild plants collection from the Tirunelveli hills of Southern Western Ghat region, Tirunelveli District, South India.

Materials and Methods

Collection of plant materials

Plant samples were collected from Tirunelveli hills, Southern Western Ghats region, Tirunelveli District, South India (Fig.1) and during the periods from 1997-2007. 50gms of dried powdered materials (Plant name and plants parts listed in table -1) were separately extracted with 50% ethanol at room temperature. Extracts of each plant were stored in the refrigerator at 4°C prior to use of phytochemical analysis. The presence of all alkaloids was determined the Culvenor and Fitzgerald methods [3]. For steroids or triterpenes, the Liebermann-Burchard test was used [4], the froth test for saponins [5] and extract react with lead acetate solution to form white precipitate test for tannin [6].

Results and Discussion

The result of phytochemical screening of sixty-two plants giving positive or negative tested for alkaloids, terpenoids, flovanoids, saponin and tannin are listed in Table -1.

Alkaloids: Sixty- three plants represent 25 families and 26 genera; 58.73% of the plants tested positively for alkaloids. Presence of active chemicals of alkaloids in the aqueous phase was detected by the formation of a precipitate on addition of Mayer's reagent (K_2HgI_4). Alkaloid isolated from *A. scholaris* was reported

previous workers [7-8]. Hadi and Bremner, [9] reported 49 families and 80 genera, and this is an indication of alkaloid reported in the variety of Lombok medicinal plants. Of these plants, twenty-three species (23%) contained alkaloids. In a survey of plants of Tasmania, Australia, which focused mainly on endemic species in this cool temperate environment [10], 15% of the plant species gave positive alkaloid tests. However, in a similar alkaloid survey in Queensland, Australia, with many tropical and sub-tropical species, 20% of species were positive [11].

Terpenoids: Liebermann Burchard reaction positive reactions were obtained from 58 samples (92.06%). Negative results were obtained such as *Bauhinia purpurea, Bauhinia malabarica, Alstonia macrophylla, Alstonia scholaris* and *Alstonia scholaris.*

Flavonoids: A total of 57 species (90.48%) gave positive reactions of flavonoids was determined using 1% aluminum chloride solution in methanol concentrated HCl, magnesium turnins, and potassium hydroxide solution. Negative results were obtained such as *Curculigo orchioides, Dioscorea pentaphylla*, *Dioscorea alata, Memecylon umbellatum, Pavetta indica* and *Psychotria beddomei.*

Saponin: A total of 32 species (50.79%) gave positive reactions for saponins. Very strong reactions were observed in fruit samples belonging to *Dioscorea pentaphylla, Dioscorea alata, Diospyros malabarica, Diospyros melanoxylon, Terminalia arjuna, Terminalia bellerica, Terminalia catappa, Terminalia chebula, Terminalia crenulata, Terminalia paniculata,* and *Terminalia travancorensis.*

Tannin: A limited number of plant species (31.74%) gave in positive results for tannins.

Table 1: Survey of Phytochemical diversity of secondary metabolism of wild plants.

SL.No	Plants	Family	Parts	Alkaloids	Triterpenes	Flavonids	Saponin	Tannin
1.	*Alstonia macrophylla*	Apocynaceae	leaf	+	-	+	-	-

2.	*Alstonia scholaris*	Apocynaceae	leaf	+	-	+	-	-
3.	*Alstonia venenata*	Apocynaceae	leaf	+	-	+	-	-
4.	*Asparagus racemosus*	Liliaceae	root	+	+	+	+	+
5.	*Bauhinia malabarica*	Fabaceae	bark	+	-	+	-	+
6.	*Bauhinia purpurea*	Fabaceae	bark	+	-	+	+	-
7.	*Begonia malabarica*	Begoniaceae	Leaf	+	+	+	+	+
8.	*Begonia cordifolia*	Begoniaceae	leaf	+	+	+	+	+
9.	*Begonia fallax*	Begoniaceae	leaf	+	+	+	+	+
10.	*Bridelia crenulata*	Euphorbiaceae	fruits	+	+	+	+	+
11.	*Capparis spinosa*	Capparaceae	leaf	+	+	+	+	-
12.	*Cinnamomum camphora*	Lauraceae	leaf	-	+	+	-	-
13.	*Cinnamomum hemungianum*	Lauraceae	leaf	-	+	+	-	-
14.	*Cinnamomum filipedicellatum*	Lauraceae	leaf	-	+	+	-	-
15.	*Cinnamomum keralaense*	Lauraceae	leaf	-	+	+	-	-
16.	*Cinnamomum malabatrum*	Lauraceae	leaf	-	+	+	-	+
17.	*Cinnamomum perrottetti*	Lauraceae	leaf	-	+	+	-	
18.	*Cinnamomum riparium*	Lauraceae	leaf	-	+	+	+	-
19.	*Cinnamomum sulphuratum*	Lauraceae	leaf	-	+	+	+	-
20.	*Cinnamomum travancoricum*	Lauraceae	leaf	-	+	+	+	-
21.	*Cinnamomum walaiwarense*	Lauraceae	leaf	-	+	+	+	-
22.	*Cinnamomum wightii*	Lauraceae	leaf	-	+	+	-	+
23.	*Citrus sinensis*	Rutaceae	leaf	-	+	+	+	-

24.	*Curculigo orchioides*	Liliaceae	hizome	+	+	-	+	-
25.	*Dioscorea pentaphylla*	Dioscoriaceae	tuber	+	+	-	+	-
26.	*Dioscorea alata*	Dioscoriaceae	tuber	+	+	-	+	+
27.	*Diospyros malabarica*	Ebenaceae	fruits	+	+	+	+	+
28.	*Diospyros melanoxylon*	Ebenaceae	fruits	+	+	+	+	+
29.	*Elacocarpus venustus*	Elaeocarpaceae	leaf	-	+	+	-	
30.	*Elaeocarpus munroii*	Elaeocarpaceae	leaf	-	+	+	-	-
31.	*Elaeocarpus serratus*	Elaeocarpaceae	leaf	-	+	+	-	-
32.	*Eugenia discifera*	Myrtaceae	leaf	-	+	+	-	-
33.	*Eugenia floccosa*	Myrtaceae	leaf	+	+	+	-	-
34.	*Garcinia gummi-gutta*	Clusiaceae	leaf	-	+	+	-	-
35.	*Garcinia travancorica*	Clusiaceae	leaf	-	+	+	-	-
36.	*Lantana camara*	Verbenaceae	leaf	-	+	+	+	-
37.	*Lantana indica*	Verbenaceae	leaf	-	+	+	+	-
38.	*Litsea beddomei*	Lauraceae	leaf	-	+	+	+	-
39.	*Litsea wightiana*	Lauraceae	leaf	-	+	+	-	-
40.	*Melia dubia*	Meliaceae	leaf	+	+	+	+	-
41.	*Memecylon malabaricum*	Melastomataceae	leaf	+	+	+	-	-
42.	*Memecylon umbellatum*	Melastomataceae	leaf	+	+	-	-	-
43.	*Michelia nilagirica*	Magnoliaceae	leaf	+	+	+	-	+
44.	*Michelia champaca*	Magnoliaceae	leaf	+	+	+	+	+
45.	*Pavetta indica*	Rubiaceae	leaf	+	+	-	-	+
46.	*Piper nigrum*	Piperaceae	leaf	+	+	+	+	-
47.	*Psidium guajava*	Myrtaceae	fruits	+	+	+	-	-
48.	*Psychotria beddomei*	Rubiaceae	leaf	+	+	-	-	-

49.	*Solanum violaceum*	Solanaceae	leaf	+	+	+	+	-
50.	*Syzygium aromaticum*	Myrtaceae	leaf	-	+	+	-	-
51.	*Syzygium calophyllifolium*	Myrtaceae	leaf	-	+	+	-	-
52.	*Syzygium densiflorum*	Myrtaceae	leaf	-	+	+	-	-
53.	*Syzygium mundagam*	Myrtaceae	leaf	-	+	+	-	-
54.	*Terminalia alata*	Combretaceae	fruit	+	+	+	+	+
55.	*Terminalia arjuna*	Combretaceae	fruit	+	+	+	+	+
56.	*Terminalia bellerica*	Combretaceae	fruit	+	+	+	+	-
57.	*Terminalia catappa*	Combretaceae	fruit	+	+	+	+	+
58.	*Terminalia chebula*	Combretaceae	fruit	+	+	+	+	-
59.	*Terminalia crenulata*	Combretaceae	fruit	+	+	+	+	+
60.	*Terminalia paniculata*	Combretaceae	fruit	+	+	+	+	+
61.	*Terminalia travancorensis*	Combretaceae	fruit	+	+	+	+	+
62.	*Vitex altissima*	Verbenaceae	leaf	+	+	+	-	-
63.	*Vitex negundo*	Verbenaceae	leaf	+	+	+	-	-

Discussion

Earlier studies on phytochemical screened for their chemical contents such as alkaloids, triterpenoids and saponins found to be 205 plant species [12]. Ahmad and Mat-Salleh (1988) had reported some screening on 148 plant samples[13]. Phytochemical screenings were also carried out on plants collected from Tawau Hills Park [14], and SayapKinabalu Park [15]. The last phytochemical screening reported was for alkaloid contents of plants from Gunung Danum area [16]. The present study was carried out the phytochemical analysis of 63 medicinal plant collected from the Tirunelveli hills, South India.

Conclusion

In conclusion, results of phytochemicals were strong color indicated for active compounds present in Tirunelveli hills of Western Ghats region, South India. Moreover, there is a need to conduct isolation and identification phytochemicals from plant species of Western Ghats.

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