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Research Article

Biochemical Profiles of Various Fresh Extracts of *Gnaphalium polycaulon* Pers.

Shanmugapriya K*, T Senthil Murugan and Thayumanavan Tha

School of Biotechnology, Dr.G.R.Damodaran College of Science, Coimbatore-641014, Tamil Nadu, India.

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ABSTRACT

Medicinal plants plays a significant role in the pharmaceutical industry. In present scenario, the need is to explore, identify and utilize this new medicinal plant on one hand and, on the other, to help conserve the existing but threatened species of rare medicinal plant.This present research work was carry out for the first time in South India to analyse and estimate the biochemical profiles of various extracts of fresh parts of *Gnaphalium polycaulon* pers., plant. The biochemical composition such as total carbohydrates, total proteins, total lipids, total phenols, cholesterol, total chlorophylls and reducing sugar, sterols were estimated using the standard procedure in fresh plant material.The biochemical analysis of *Gnaphalium polycaulon* plant showed the presence of various phytochemicals. The results of the present study supplement the usage of the studied plant which possesses several bioactive compounds and used as food and also as medicine.The results of present studies demonstrated that *Gnaphalium polycaulon* plant could be a sourceof valuable information and a guideline for the scientists, researchers in India and also all over the world.

Keywords: Medicinal plants, *Gnaphalium polycaulon*, biochemical analysis, carbohydrates, proteins, lipids.

INTRODUCTION

India is the largest producer of medicinal herbs and is appropriately called the botanical garden of the world. Medicinal plants in the Western Ghats contains rich mega biodiversity due to numerous plants species with significant biological properties that acts as a potential source of phytoconstituents[1]. In 2002, the U.S. National Center for Complementary and Alternative Medicine of the National Institutes of Health began funding clinical trials into the effectiveness of herbal medicine[2]. The National Medicinal Plants Board (NMPB) was set-up in 2000 by the Government of India, under AYUSH, has the primary mandate of coordinating all matters relating to medicinal plants and support policies and programme for growth of trade, export, conservation and cultivation.

Medicinal plants have been used as a traditional form of medicine since time immemorial[3]. The natural products derived from medicinalplants have proven to be an abundant source of biologically active compounds, many of which have been the basis for the development of new chemicals for pharmaceuticals. Since ancient times, plants have been an exemplary source of medicine.

Many reports stated that Asteraceae family is considered as abundant flowering plants with many therapeutic properties and reported as folkloric medicinal plants[4]. The genus, *Gnaphalium* was reported to have antioxidant, antibacterial, antifungal, anti-complement, antitussive and expectorant, insect anti-feedant[5], cytotoxic, anti-inflammatory, anti-diabetic and anti-hypouricemic properties[6] due to the presence of flavonoids, phenolic glycosides, diterpenes, triterpenes, phytosterols and other major phytocompounds.

The genus *Gnaphalium*, an herb distributed worldwide, comprises approximately 200 species of the Compositae (Asteraceae) family that belongs to the tribe Gnaphalieae. *G. polycaulon*is an annual widespread weed in tropical and subtropical Africa, Asia, Australia, and America[7]. The traditional practices on *G. polycaulon* was followed by the tribal communities in the Nilgiri District for healing purposes and treats burns wounds[8] and also for various aliments without side effects till date.

Hence in present scenario, the need to explore, identify and utilize this new medicinal plant on one hand and, on the other, to help conserve the existing but threatened species of rare medicinal plant. The literature survey reported that there are limited research works on the biological properties of *Gnaphalium* sp. So, this research work was carried out for the first time in South India to evaluate its various biochemical profiles.

MATERIALS AND METHODS

The present study aimed on the analysis of biochemicals from plant *G. polycaulon* was carried out. The selection of the plant was done based on the traditional knowledge of the local herbal medicinal practitioners among very few locations of Western Ghats and in Kothagiri, The Nilgiri District, Tamil Nadu, India and collected.

Collection and identification of plant samples

Following the collection, the plant samples were submitted to Botanical Survey of India (BSI), Coimbatore. They have been identified and confirmed as *Gnaphalium polycaulon*

*Author for Correspondence: shanmugapriya8@gmail.com

Table 1: Percentage yield of various extracts of *G. polycaulon.*

Plant parts	Aqueous extract	Ethanolic extract	Hexane extract	Methanolic extract
Fresh leaf	24.3± 1.2	21.1±1.1	20.5±1.2	22.2±1.2
Fresh stem	17.1±1.1	16.8±1.2	15.2±1.2	18.6±1.2
Fresh flower	12.5±0.9	11.7±0.8	10.8±0.8	15.3±1.1

All the values are means of three independent determinations, n=3, analyzed in triplicate.

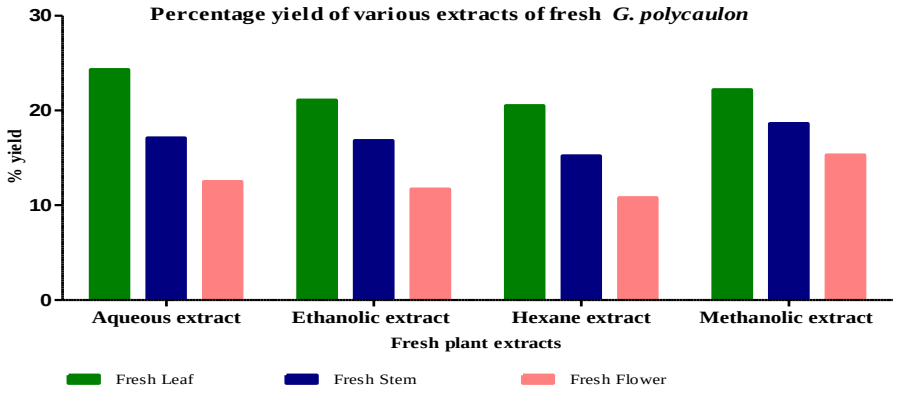

Figure 1: Percentage yield of various extracts of *G. polycaulon.*

Pers. (=*Gnaphalium indicum* Hook. f.) - Asteraceae family. Herbarium specimen has been authenticated and incorporated by the Madras Herbarium.

Chemicals required

All chemicals used for this study were high quality analytical grade reagents. The solvents such as methanol, acetone, ethanol and hexane were purchased from S.D. Fine Chemicals Pvt. Ltd, Sigma chemicals, Lobe chemicals, Merck Chemical Supplies, Nice Chemicals and Himedia. All other drugs and chemicals used in the study were obtained commercially and were of analytical grade.

Preparation of plant extracts

In order to remove the debris and dust particles, collected plant materials were gently washed with sterile distilled water without damaging their parts. The plant materials such as leaf, stem and flower of plant parts were used for the extraction process. Fresh plant samples were directly used for the extraction process.

Extraction of phytoconstituents

Following shadow drying as per standard method of extraction, forty grams of the fresh samples of leaf, stem and flower were weighed and dissolved in 250 ml of the respective solvents such as aqueous, ethanol, hexane, and methanol, based on the crescent order of polarity to obtain phytoconstituents[9]. Resulting extracts were individually concentrated by applying vacuum to get dry powder using rotary evaporator and subjected to lyophilizaion. The obtained crude extracts were packed in air-tight plastic containers and stored in refrigerator at 4 ºC for further applications.

Extract recovery yield percentage

Each extracts were dried after successive solvent extraction and the percentage recovery yield of the each extract were calculated as follows:

$$Recovery\ yield\ (\%) = \frac{Weight\ of\ the\ extract}{Weight\ of\ the\ plant\ material\ (g)}\ X\ 100$$

In order to confirm the recovery yield percentage, triplicate values have been arrived and recorded.

Biochemical profiles of various extracts of G. polycaulon

Analysis of biochemical parameters in *G. polycaulon* was carried out with standard methods[10]as follows: Total carbohydrates by Anthrone method, Starch by Anthrone method, Glucose by Glucose oxidase method, Fructose by Resorcinol method, Cellulose by Anthrone method, Cholesterol by Zak's method, DNA by Diphenylamine method, RNA by Orcinol method, Protein by Lowry's method, Reducing sugar by 3, 5-dinitrosalicylic acid method, Sterols by Liberman-Buchard method, and Chlorophyll.

RESULTS

Extract recovery yield percentage

The yield percentage of *G. polycaulon* was shown in Table 1. The aqueous extract of fresh leaf showed higher amount of yield 24.3% than other extracts. On the other hand, hexane extract of fresh flower showed lower recovery percentage of 10.8% compared to all extracts.

Biochemical profiles ofvarious extracts of G. polycaulon

The amount of biochemicals such as total carbohydrate, starch, DNA, RNA, total protein, total sugar, cholesterol and total chlorophylls were analysed in fresh extracts of *G. polycaulon* exhibited high biochemicals content in aqueous extract of fresh leaf followed by all other extracts (Table 2).

The concentration of carbohydrates was found to be 0.62 mg/g in aqueous extract of fresh leaf which were comparatively higher than those in the corresponding stem and flower in fresh samples respectively. The amount of glucose, fructose, cellulose, reducing sugar and starch

Table 3: Biochemical profiles of various extracts of fresh parts of *G. polycaulon.*

Biochemicals	*Aqueous extract*			*Ethanolic extract*			*Hexane extract*			*Methanolic extract*		
(µg/ml)	leaf	stem	flower	leaf	stem	flower	leaf	stem	flower	leaf	stem	flower
Total carbohydrates	0.62	0.37	0.30	0.57	0.31	0.22	0.54	0.30	0.18	0.58	0.33	0.24
Starch	1.59	1.21	0.78	1.48	0.99	0.65	1.45	0.93	0.57	1.56	1.12	0.71
Glucose	2.00	1.72	1.04	1.89	1.61	0.93	1.82	1.53	0.85	1.92	1.56	0.94
Fructose	1.38	0.96	0.40	1.28	0.88	0.27	1.23	0.85	0.24	1.31	0.90	0.32
Cellulose	0.74	0.68	0.62	0.65	0.59	0.55	0.61	0.50	0.52	0.69	0.61	0.57
Cholesterol	0.85	0.76	0.68	0.74	0.63	0.59	0.74	0.57	0.55	0.79	0.67	0.62
DNA	48.0	44.0	40.0	45.0	40.0	36.0	42.0	36.0	33.0	47.0	42.0	38.0
RNA	19.0	17.0	15.0	17.0	14.0	11.0	15.0	12.0	10.0	18.0	15.0	14.0
Protein	13.0	12.6	11.9	12.3	11.6	10.4	11.2	10.2	9.40	12.5	11.8	10.9
Reducing sugar	1.65	1.05	0.98	1.53	0.94	0.86	1.41	0.85	0.76	1.58	0.99	0.92
Sterols	0.83	0.74	0.66	0.77	0.68	0.59	0.71	0.65	0.52	0.79	0.71	0.62
Chlorophyll	0.24	0.21	0.19	0.21	0.18	0.16	0.18	0.15	0.13	0.23	0.21	0.17

All the values are means of three independent determinations, n=3, analyzed in triplicate.
Each value represents Mean ±SEM (n=3), one way ANOVA was analysed and followed by Dunnet's multiple test for mean values showed differ significantly from each other ($p<0.005$).

(mg/g dry weight) were present in abundant amounts of the aqueous extract of fresh leaf has 2.00 mg/g than other extracts. The biochemical profile of plants is the most important parameter used for the characterization of plants[11]. Carbohydrate is one of the important components for metabolism and it supplies the energy needed for respiration and other most important processes[12].

The cholesterol contents content revealed remarkable amount of 0.85 mg/g in aqueous extract of fresh leaf. A significant amount of sterols content in *G. polycaulon* showed high amount of 0.83 mg/g in aqueous extract of fresh leaf. Lipids are rich in -C=O- bonds, providing much more energy in oxidation processes than other biological compounds and constituted a convenient storage material for living organisms[10].

The total protein contents in *G. polycaulon* were found relatively high amount of 16.6 mg/ml in aqueous extract of fresh leaf among other extracts. The DNA and RNA content of aqueous extract of fresh leaf exhibited about 48 and 19 mg respectively. Proteins have crucial functions in all the biological processes by enzymatic catalysis, transport and storage, mechanical sustentation, growth and cellular differentiation control[13].

The total chlorophylls in fresh extracts of *G. polycaulon* was found to be 0.24 mg/g in aqueous extract of fresh leaf. Total chlorophyll content was the summative value of the chlorophyll 'a' and chlorophyll 'b'[14].

The biochemical profile and chemical compositions of fresh and dried parts of*G. polycaulon* plant in four different solvents were analysed by compared with a standards clearly stated that it often influenced by different origins, environmental, and seasonal factors[15].

Ethnobotanical data about 32 medicinal plants reported that *Gnaphalium polycaulon* Pers. with local name of *Neranbu chedi* was also widely existing medicinal plant by the tribal Todas communities of Nilgiri district of South India as herbal medicines for traditional medicinal uses[8]and also as useful remedy for healing wounds burns and nerve related injuries but their full potential have not yet been utilized scientifically.

Based on those studies[7, 16,17,18, 6], it has been reported that *Gnaphalium polycaulon* plant has considerable antimicrobial activity and rich with carbohydrate. Hence, there is no information about the presence of phytoconstituents and related substances with *G. polycaulon,* so this study has been taken to document and enrich the knowledge on selected plant. They also suggested the effective usage of this plant in food and pharmaceutical industries.

CONCLUSION

The biochemical profile of the present study suggests that *G. polycaulon* have considerable carbohydrates,lipids, and chlorophylls for the use of food andpharmaceutical industry as a source inpreparation of nutrient supplements, medicineand fine chemical synthesis.Based on the wide medicinal applications of *G. polycaulon*, various fresh parts have been selected to evaluate the efficiency in treating various ailments. It was found that*G. polycaulon* was appearedto be interesting potential sources of plantfood proteins owing to their highcarbohydrate level.

CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest

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