Advances in Natural and Applied Sciences, 3(1): 56-59, 2009
ISSN 1995-0772

ORIGINAL ARTICLE

Phytochemical and Chemical composition evaluation of Volatile Oil of *Callistemon linearis DC* Leaf

[1]Anudwipa Das, [2]K. Zaman, [3]Akhilesh V. Singh

[1]*Department of Pharmaceutical Sciences Dibrugarh University, Assam, India-786004*
[2]*Department of Pharmaceutical Sciences Dibrugarh University, Assam, India-786004*
[3]*Department of Pharmaceutical Sciences Dibrugarh University, Assam, India-786004*

Anudwipa Das, K. Zaman, Akhilesh V. Singh: Phytochemical and Chemical composition evaluation of Volatile Oil of *Callistemon linearis DC* Leaf: *Adv. in Nat. Appl. Sci., 3(1): 56-59, 2009*

ABSTRACT

Phytochemical Investigation of various leaf extracts and Evaluation of volatile oil composition of *Callistemon linearis* leaf were studied. After phytochemical investigation of leaf extracts, it was revealed that carbohydrates, glycosides, phenolic compounds like flavonoids, saponins, and phytosterol were present. Chemical composition of volatile oil was hydro distilled from the fresh leaves was also evaluated by GC and GC/MS analysis. It was found that the oil contains four components mainly n-Dec-3-ene (5.4%), 3-carene (10.7%), 1, 8-cineole (58.3%), γ -terpinene (25.3%).

Key words: *Callistemon linearis*, volatile oil,n-Dec-3-ene,3-carene,1,8-cineole, γ-terpinene.

Introduction

The genus Callistemon (Family: Myrtaceae) is a beautiful evergreen shrubs and small trees with 34 species. The majority of Callistemon species are endemic to Australia; four species are also found in New Caledonia. They are commonly known as bottle brushes because of their cylindrical brush like flowers resembling a traditional bottle brush. They are found in the more temperate regions of Australia and seven species of callistemon have been introduced in India as an ornamental tree(Kanjilal and Das,1992).Phytochemical studies of different callistemon species revealed that the presence of different monoterpenes, sesquiterpenes flavonoids . There are several reports of the oil exhibiting fungi toxicity, inhibit the growth of cowpea mosaic virus, mungbean mosaic virus(Aburjai et al.,2006).The ethnic tribal communities have been using this plant for many generation and information regarding the efficacy remain primarily anecdotal. *Callistemon linearis* DC. (Narrow leaved bottle brush) is a small aromatic evergreen tree with rough fissured bark and dropping branches, it is about 2.7 m in height, up to 12 cm long, pungent aromatic leaves. Red flowers in spikes up to 10 cm long and a woody capsule .An alcoholic extract of fruit showed antibacterial activity against gram positive and gram negative bacteria and mycobacterium. The seeds of a sample from Japan yielded an oil containing β-sitosterol (The wealth of India, 1992).

This plant was not well studied from phytochemical and volatile oil analysis point of view .The aim of present study is to investigate the phytochemical and volatile oil composition of *Callistemon linearis* DC leaf.

Corresponding Author: Anudwipa Das, Department of Pharmaceutical Sciences Dibrugarh University, Assam, India-786004
Ph-+919760883696 Fax no-0135 2734575
E- mail- anudwipa@gmail.com

Materials and Methods

Collection of plant material

The plant *Callistemon linearis* DC. (Bottle brush tree) was collected from Dibrugarh University campus and identified by Botanical Survey of India (BSI), Shillong. A voucher specimen number (DU/PHC/HRB-4/08) was deposited in the departmental herbarium store.

Preparation of extracts

Hot continuous percolation

The collected plant materials (leaves) were dried in shade for about 15 days and made into coarse powder. The powders obtained were passed through sieve no: 20 and then used for successive crude extraction by different solvent such as petroleum ether, chloroform, methanol, ethanol. The method of extraction has been performed using soxhlet extractor with the different solvent for 6-8 hours, mark obtained after each extraction was dried and concentrated under reduced pressure separately(CK Kokate,1994;Kokate *et al.*,1999).

Phytochemical screening of different extracts

The different qualitative chemical tests are to be performed for establishing profile of the extracts for its nature of chemical composition (KR Khandelwal, 2004). The preliminary phytochemical tests were carried out to detect the presence of steroid, alkaloid, tannin and phenolic compound, glycoside, carbohydrate, flavonoids, saponins etc.

Isolation of Volatile oil

Fresh leaves of *Callistemon linearis* DC (80-100 g) cut into small pieces subjected to hydro distillation for 3 hrs using a Clevenger type apparatus. Light yellow colored oil was obtained (0.40% v/w). The oil was dried over anhydrous sodium sulphate and stored in sealed vials at low temperature (4^0C) before analysis (Trease and Evans, 2002; Ahmed et al., 2008).

GC Analysis

The GC Analysis of the oil was performed on a various 3300 gas chromatogram, using a fused capillary /column (30mm×0.25mm i.d., film, thickness 0.25 µm) coated with dimethyl siloxane (DB-1). The oven temperature was programmed at 80-225^0C at 4^0C/min, then held isothermally at 250^0C .The detector used was FID detector temperature 300^0C, injection volume 0.1 µl and carrier gas nitrogen was used.

GC-MS Analysis of Volatile oil

The GC-MS analysis data's were obtained on a Shimadzu QP-2000 instrument (Shimadzu, Japan) at 70 eV and 250^0C. The GC column used was ULBONHR-1 (unless otherwise specified) equivalent to OV-1, fused silica-capillary (0.25mm×50M) with film thickness 0.25µ. The other conditions are given on the GC-MS traces.

An entry such as 100-6-10-250 means that the initial temperature was 100^0C for 6 min, and then heated at the rate of 10^0C /min to 250^0C. Carrier gas helium was used and the flow rate 2ml/min maintained.

Identification of volatile oil compound

The compounds were identified by comparing the retention indices (RI) of the peaks on BP-1 column with literature values, matching against the standard library spectra, built up using pure substances and components of known essential oils. The structures were finally confirmed by comparison of mass spectra fragmentation pattern with published data.

The components of the oil and the percentage of each constituent and their RI values were summarized in Table-2 .The components are arranged in order of GC and GC-MS elution on DB-1 and ULBONHR-1 fused silica column respectively.

Result and Discussion

The extract so obtained from *Callistemon linearis* leaf were subjected to preliminary phytochemical screening for detection of chemical constituents present in them .The result of phytochemical screening of different extracts (petroleum ether extract, chloroform extract, methanol extract, ethanol extract) revealed that ,carbohydrates, glycosides, , phenolic compounds like flavonoids, saponins, and phytosterols were present in leaf extract which is tabulated in Table-1.

Table 1: Qualitative phytochemical screening results of *Callistemon linearis* D.C. leaf extracts

Serial no.	Test	Extracts of leaves of *Callistemon linearis* DC			
		Petroleum ether extract	Chloroform extract	Methanol extract	Ethanol extract
1.	Alkaloids	-	-	-	-
2.	Carbohydrates	+	+	+	+
3.	Glycosides	-	-	+	+
4.	Flavonoids	-	-	+	+
5.	Phytosterols	+	-	+	+
6.	Saponins	-	-	+	+
7.	Phenolic compounds	-	-	+	+

(-): Absent; (+): Present;

Chemical composition of volatile oil

This is the first report on the chemical composition of volatile oil of *Callistemon linearis* leaf .After hydro distillation *of C.linearis* DC leafs. It was found that plant yielded 0.40 %(v/w) of a light yellowish oil with an aromatic turpentity aroma and taste. The GC-MS analysis of volatile oil produced four components and they were characterized. The oil components were detected by comparison of the fragmentation patterns in the resulting mass spectra with those published in literature. These are listed in Table-2 with their percentage share. Among these components one was aliphatic hydrocarbon i.e. n-Dec-3-ene(5.4%) and three others identified as monoterpenes ,namely: 3-carene(10.7%),1,8-cineole(58,3%), γ -terpinene(25.3%).In according with the results of these studies, it was found that 1,8-cineole was the most prominent component of this oil, and γ -terpinene(25.3%), 3-carene(10.7%) and n-Dec-3-ene was found

Table 2: Summarize data of identified compound

Serial no.	Component	R.I.	Percentage (%)
1	n-Dec-3-ene	961	5.4
2	3-carene	1000	10.7
3	1,8 -cineole	1017	58.3
4	γ-terpinene	1053	25.3

Conclusion

In conclusion, the leaf extracts of plant contain carbohydrate, glycoside, flavonoids, saponin,, phytosterol, phenolic compounds and volatile oil of leaf contain 4 component namely n-Dec-3-ene,3-carene,1,8-cineol,gama-terpinine. Future work is to investigate the biological activities of different plant extracts and volatile oil of *Callistemon linearis* leaf.

Acknowledgement

We are thankful to CDRI, Lucknow for carrying out GC-MS Analysis.

References

Kanjilal and Das, 1992. flora of Assam, Omsons Publications.

Aburjaj Talal and Hudaib Mohammad, 2006. antiplatelet, antibacterial and antifungal activities of Achillea falcata extracts and evaluation of volatile oil composition. Phcog. Mag: Research Article, 2: 191-198.

Anonymous, The wealth of India,1992. CSIR, New Delhi.
Kokate, C.K., 1994. (reprint: 2001).Practical Pharmacognosy, Allah prakasion, pp: 122-135.
Kokate, C.K., A.P. Purohit, S.B. Gohale, 1999. Pharmacognosy, pp: 78.
Khandelwal, K.R., 2004. Practical Pharmacognosy Techniques and Experiments, Nirali Prakashan, pp: 159.
Khandelwal, K.R., 2004. Practical Pharmacognosy Techniques and Experiments, Nirali Prakashan, pp: 149-153.
Trease, G.E., W.C. Evans, 2002. Pharmacognosy, WB Saunders, London, U.K., pp: 253.
Ahmed Al-Harrasi and Salim Al-Saidi, 2008. Phytochemical analysis of the essential oil from botanically certified oleo gum Resin of Boswellia sacra. Journals of Molecules, 13: 2181-2189.