Innovare
Academic Sciences

International Journal of Pharmacy and Pharmaceutical Sciences

ISSN- 0975-1491 Vol 7, Issue 2, 2015

Short Communication

GC-MS ANALYSIS OF RHIZOME ESSENTIAL OIL OF *BOSENBERGIA LONGIFLORA* (WALL) KUNTZE RICH IN LONGIPNOCARVONE, A SESQUITERPENOID

BASUDEBA KAR[1], PRATAP CHANDRA PANDA[2], SUPRAVA SAHOO[1], BISWABHUSAN DASH[1], SANGHAMITRA NAYAK[1*]

[1]Centre of Biotechnology, School of Pharmaceutical Sciences, Siksha 'O' Anusandhan University, Bhubaneswar, India, [2]Taxonomy and Conservation Division, Regional Plant Resource Centre, Bhubaneswar, Odisha, India.
Email: sanghamitran24@gmail.com

Received: 09 Oct 2014 Revised and Accepted: 10 Nov 2014

ABSTRACT

Objective: *Bosenbergia longiflora* (wall.) Kuntze is a rhizomatous plant of family Zingiberaceae which has been traditionally used for curing many diseases like inflammatory bowel disease, ulcerative colitis, aphthous ulcer,antiinflamatory, healing of wound etc. The present work is aimed at phytochemical profiling, especially terpenoids, of rhizome essential oil of *Bosenbergia longiflora* (wall.) Kuntze using gas chromatography and mass spectrometry (GC-MS) analysis.

Methods: The essential oil from mature fresh rhizome was extracted by hydro distillation method by using Clevenger's apparatus. GC-MS analysis of essential oil was carried out to identify major volatile constituents.

Results: The present work revealed that the oil was highly rich in longipinocarvone, a sesquiterpenoid, as major compound (81.69%). The oil also contained trans-caryophyllene (1.54%), β-Cis caryophyllene (3.41%), patchoulene (2.97%), borneol (2.32%), limolene (1.5%) etc. GC- MS detected 13 compounds out of which 12 compounds could be identified.

Conclusion: GC-MS analysis of *Bosenbergia longiflora* revealed an abundance of longipinocarvone which may responsible for many activities it possesses. The percentage of longipinocarvone being higher in this plant, it could be explored for various pharmaceutical uses.

Keywords: *Bosenbergia longiflora*, Zingiberaceae, GC-MS, Essential Oil, Longipinocarvone.

Plants are natural source of valuable secondary metabolites which can be used in pharmaceutical industries in a safe and effective way. *Bosenbergia*, a genus of family Zingiberaceae, comprises of approximately 80 species worldwide. *Bosenbergia* species are extremely rare compared to Zingibearaceous species. Mostly, they are found in very damp shaded areas [1]. Mostly its rhizome part exhibits medicinal importance. *Bosenbergia longiflora* has ethno medicinal properties as its rhizomes are taken in case of dysentery and diarrhoea. Traditionally it has been used for curing of inflammatory bowel disease, ulcerative colitis, aphthous ulcer. Moreover, recently it has been reported that ethanolic extracts of *B. longiflora* showing effective anti-inflamatory and wound healing activities [2].

Although this plant possesses many activities it is unclear what are the major bioactive constituents responsible for its importance. There are no reports on GC-MS analysis of rhizome oil of *Boesenbergia longiflora* available so far. Existing reports includes many studies on other species like *Boesenbergia pandurata* [3,4], *Boesenbergia stenophylla* [5]. etc. In the present study, we have reported first time GC-MS based chemical profiling of essential oil of traditional important medicinal plant *Bosenbergia longiflora.*

Plants of *Bosenbergia longiflora* (wall.) Kuntze were collected with rhizomes from Phulbani, Odisha, India. Plants were identified by taxonomist Dr. P. C. Panda. *Bosenbergia longiflora* (wall.) Kuntze has been reported from Odisha for first time [6].

The fresh rhizomes were washed to remove soil, peeled and sliced. Sliced rhizomes (100g) were dried and allowed to hydro distillation using a Clevenger's apparatus. A flask containing rhizomes was heated for 2-6 hrs and the condensed vapour was separated throughout an auto-oil/water separator. The oil present at the upper most layers was collected in a container and treated with a pinch of anhydrous magnesium sulphate to make moisture free. Each essential oil extraction was run in triplicates. The oil samples were stored at 0°C in air tight container after drying for gas chromatographic analysis.

Essential oil from rhizomes of *B. longiflora* was analysed on a 6890 series instrument (Agilent Technologies, Palo Alto, CA, USA),equipped with MS and a HP-5 fused silica capillary column (30mx0.25 mm internal diameter; film thickness 0.25 mm). GC-MS (70 ev) data was measured on coupled with MSD 5973. MS source temperature at 230°c; MS Quadra pole temperature at 150°c; interface temperature at 290°c; mass scan, 20-600amu.

Compound identification was done by comparing their retention indices and fragments of mass spectra with the data gave in the NIST library version 3.02 and Wiley library vol II on the basis of mass to charge ratio. The pattern of fragment of spectra has compared with the fragment of spectra present in the library. The maximum similarity of pattern of fragment found in the library is considered as the compound present in the analyte. The accuracy of identified compound is high as the pattern of fragment and mass to charge ratio is different for different compounds.

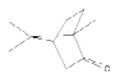
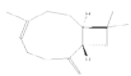
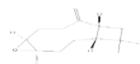
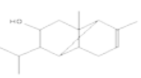
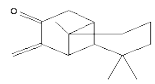
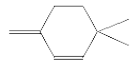
Hydrodistillation of fresh rhizomes of *Boesenbergia longiflora* yielded 2.3% as on dry weight basis of plant material. As reported essential oil yield differs from species to species viz *Boesenbergia pandurata* yields approximately 3.30% rhizome oil [7] and *Boesenbergia stenophylla* yields 3.39% [5]. The oil of *Boesenbergia longiflora* being quite good can be used for commercial exploitation. The chemical constituents, peak area percentage, retention indices, structures etc. of oil are given in (Table-1).

Terpenoids have many medicinal and physiological properties and produced on a scale of about 10 tonnes per year [8]. *Boesenbergia longiflora* being rich in terpenoids, it needs to exploit the potentials of these plants especially for traditional medicine and pharmaceutical industries.

Although, the potential of longipinocarvone has not been explored, It is expected as a potential compound because of the presence of important carvone group which is found naturally in essential oils and extensively used in the food and flavor industry. Oils containing carvones are also used in aromatherapy and alternative medicine. According to De Carvalho *et al;* 2006, carvone has been used for millennia in food. S-(+)-Carvone is also used to prevent premature sprouting of potatoes during storage, being marketed in the Netherlands for this purpose under the name talent.

Further, (R)-(–)-Carvone has been proposed for use as a mosquito repellent and the U. S. An Environmental Protection Agency is reviewing a request to register it as a pesticide. The percentage of this compound is very low in other plants studied so far like 5.68% in *Litsea fulva* [9], 0.35 in *Bidens parviflora* [10] etc. which are quite difficult to exploit commercially. As per the result *Boesenbergia longiflora* the only plant which occupies 81.69% of area as longipinocarvone having enough significance for commercial exploitation. The present work will give a strong support to carry out further research on it. This report could help to isolate the compound from this plant and to carry out its bioactivity studies for exploring the full potential of *Boesenbergia longiflora.*

Table 1: components identified in rhizome essential oil of *Bosenbergia longiflora* (wall) Kuntze

S. No.	RT	Name of Compound	Molecular formula	Molecular weight	Peak Area %	Structures
1	5.936	Limonene	$C_{10}H_{16}$	136.2340	1.51	
2	9.592	Camphor	$C_{10}H_{16}O$	152.2334	1.17	
3	10.387	Borneol	$C_{10}H_{18}O$	154.2493	2.32	
4	20.206	trans-Caryophyllene	$C_{15}H_{24}$	204.3511	1.54	
5	20.515	γ – Elemene	$C_{15}H_{24}$	204.3511	1.55	
6	21.932	β- famesene	$C_{15}H_{24}$	204.3511	0.48	
7	26.111	β-cis-Caryophyllene	$C_{15}H_{24}$	204.3511	3.41	
8	26.497	caryophyllene oxide	$C_{15}H_{24}O$	220.3505	1.07	
9	27.267	Patchoulene	$C_{15}H_{24}$	204.3511	2.97	
10	27.776	Cis-α –copanene-8-ol	$C_{15}H_{24}O$	220.3505	0.81	
11	30.581	Longipinocarvone	$C_{15}H_{22}O$	218.3346	81.69	
12	33.023	3,3-Dimethyl-6-methylenecyclohexene	C_9H_{14}	122.2075	0.95	

GC-MS analysis of oil revealed the presence of 13 compounds out of which 12 compounds were identified. This rhizome oil is highly rich in longipinocarvone a sesquiterpenoid which constituted 81.69% (Fig.1) of total oil (Table-1). The oil also contains β-cis-Caryophyllene (3.41%), trans- caryophyllene (1.54%), patchoulene (2.97%), borneol (2.32%), γ-Elemene (1.55%), limolene (1.5%), 2 Bonanone (1.17%), caryophyllene oxide (1.07%), cis-α-copanene-8-ol (0.81%), p- famesene-(0.48%) and 3,3-Dimethyl-6-methylenecyclohexene (0.95%).

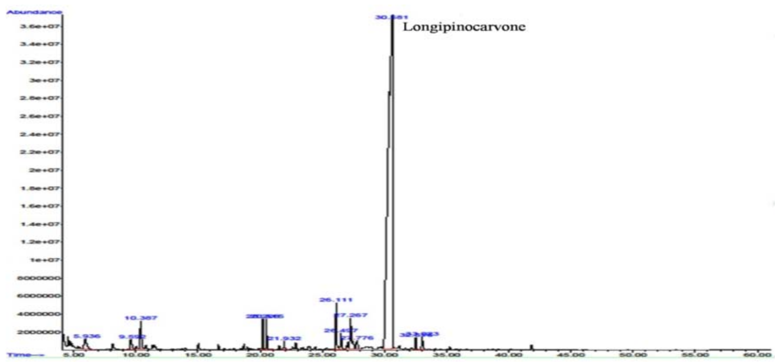


Fig. 1: Chromatogram showing peaks of identified compounds against retention time and abundance. Longipinocarvone occupyied highest area (81.6%)

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