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Isolation of Zerumbone, the Potent Bioactive Compound, from Sri Lankan Zingiber Zerumbet (L)

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Introduction: Zingiber zerumbet (L), a member of the family Zingiberaceae, known as "Wal-inguru" in Sri Lanka is a medicinal herb distributed in Sri Lanka, Bangladesh, India, Malaysia and Nepal. This plant is used to treat stomach aches, worm infestation in children, swelling sores and loss of appetite in traditional medicine in Sri Lanka. It has been reported that zerumbone, isolated from rhizome of Z. zerumbet has reduced the inflammatory response of acute lung injury in endotoxin–treated mice via Akt-NFkB pathway. Also, zerumbone shows anticancer, anti-inflammatory, anti-ulceration, antioxidant and antimicrobial properties. Use of Sri Lankan Z. zerumbet in immunomodulatory and lung protection herbal preparations needs scientifically validated zerumbone content in Sri Lankan Zingiber zerumbet.

Objective: To isolate zerumbone and quantify the content for potential biomedical and clinical experiments/applications.

Methods: The rhizome and leaf of Z. zerumbet from Nilgala forest of Sri Lanka was hydro-distilled to obtain its volatile oils and analyzed for volatile oil composition using GC-MS. The essential oil extracted from the rhizome was purified to isolate zerumbone by size exclusion chromatography using Sephadex LH20 followed by preparative HPLC. The purified zerumbone was confirmed by 1H-NMR, 13C-NMR and 2D-NMR including HH-COSY, NOESY, DEPT-HSQC and HMBC analysis.

Results: The leaf oil contained 28 compounds in which 26 compounds were identified by GC-MS. It has trans-nerolidol (41.0%), β-caryophyllene (21.3%) and zerumbone (6.2%) as the major compounds. The rhizome oil contained 16 compounds of which 14 compounds were identified by GC-MS. The major components of rhizome oil were zerumbone (68.7%), humulene (12.2%) and camphene (3.6%).

Conclusions: The rhizome oil had 68.7% zerumbone whereas leaf oil had 6.2%. The novel approach adopted in this study could isolate zermbone with high purity (99.9%) in sufficient quantities for of zerumbone for potential biomedical applications and lung protection studies.

Keywords: Hydro-distillation, Volatile oils, Zingiber zerumbet, Zerumbone, Sri Lanka