



Purchase



Search ScienceDirect



Advanced search

You have **Guest** access to ScienceDirect [Find out more...](#)

Journal of Ethnopharmacology

Volume 127, Issue 2, 3 February 2010, Pages 515–520



Comparative antioxidant and anti-inflammatory effects of [6]-gingerol, [8]-gingerol, [10]-gingerol and [6]-shogaol

Swarnalatha Dugasani^a, Mallikarjuna Rao Pichika^c, Vishna Devi Nadarajah^c, Madhu Katyayani Balijepalli^c, Satyanarayana Tandra^a, Jayaveera Narsimha Korlakunta^b[Show more](#)

Choose an option to locate/access this article:

Check if you have access through your login credentials or your institution

[Check access](#)

Purchase \$35.95

[Get Full Text Elsewhere](#)

doi:10.1016/j.jep.2009.10.004

[Get rights and content](#)

Abstract

Ethnopharmacological relevance

Zingiber officinale Rosc. (Zingiberaceae) has been traditionally used in Ayurvedic, Chinese and Tibb-Unani herbal medicines for the treatment of various illnesses that involve inflammation and which are caused by oxidative stress. Although gingerols and shogaols are the major bioactive compounds present in Zingiber officinale, their molecular mechanisms of actions and the relationship between their structural features and the activity have not been well studied.

Aim of the study

The aim of the present study was to examine and compare the antioxidant and anti-inflammatory activities of gingerols and their natural analogues to determine their structure–activity relationship and molecular mechanisms.

Materials and methods

The in vitro activities of the compounds [6]-gingerol, [8]-gingerol, [10]-gingerol and [6]-shogaol were evaluated for scavenging of 1,1-diphenyl-2-picrylhydrazyl (DPPH), superoxide and hydroxyl radicals, inhibition of N-formyl-methionyl-leucyl-phenylalanine (f-MLP) induced reactive oxygen species (ROS) production in human polymorphonuclear neutrophils (PMN), inhibition of lipopolysaccharide induced nitrite and prostaglandin E₂ production in RAW 264.7 cells.

Results

In the antioxidant activity assay, [6]-gingerol, [8]-gingerol, [10]-gingerol and [6]-shogaol exhibited substantial scavenging activities with IC₅₀ values of 26.3, 19.47, 10.47 and 8.05 μM against DPPH radical, IC₅₀ values of 4.05, 2.5, 1.68 and 0.85 μM against superoxide radical and IC₅₀ values of 4.62, 1.97, 1.35 and 0.72 μM against hydroxyl radical, respectively. The free radical scavenging activity of these compounds also enhanced with increasing concentration (P < 0.05). On the other hand, all the compounds at a concentration of 6 μM have significantly inhibited (P < 0.05) f-MLP-stimulated oxidative burst in PMN. In addition, production of inflammatory mediators (NO and PGE₂) has been inhibited significantly (P < 0.05) and dose-dependently.

Conclusions

6-Shogaol has exhibited the most potent antioxidant and anti-inflammatory properties which can be attributed to the presence of α,β-unsaturated ketone moiety. The carbon chain length has also played a significant role in making 10-gingerol as the most potent among all the gingerols. This study justifies the use of dry ginger in traditional systems of medicine.

Graphical abstract

Recommended articles

[Analgesic and anti-inflammatory activities...](#)
2005, Journal of Ethnopharmacology [more](#)

[Cancer preventive properties of ginger: ...](#)
2007, Food and Chemical Toxicology [more](#)

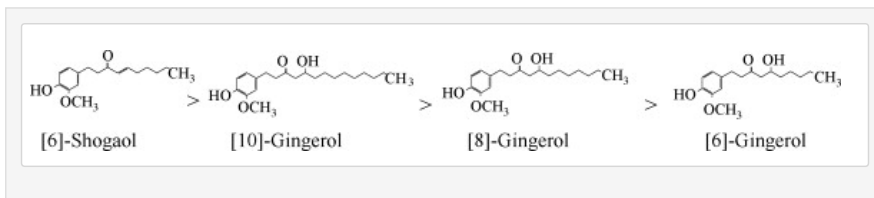
[6-Shogaol inhibits monosodium urate cr...](#)
2010, Food and Chemical Toxicology [more](#)

[View more articles »](#)

Citing articles (114)

Related book content

The standard major non-volatile pungent compounds of ginger – [6]-gingerol, [8]-gingerol, [10]-gingerol and [6]-shogaol – were tested for their antioxidant and anti-inflammatory activities. Relative potencies are as follows.



Abbreviations

CL, chemiluminescence; DPPH, 1,1-diphenyl-2-picrylhydrazyl; DMSO, dimethylsulphoxide; f-MLP, N-formyl-methionyl-leucyl-phenylalanine; LPS, lipopolysaccharide; NO, nitric oxide; PGE₂, prostaglandin E₂; PMN, polymorphonuclear neutrophils; RNS, reactive nitrogen species; ROS, reactive oxygen species; TS, tested samples

Keywords

[6]-Gingerol; [8]-Gingerol; [10]-Gingerol; [6]-Shogaol; Antioxidant; Anti-inflammatory



Corresponding author at: Department of Pharmaceutical Chemistry, International Medical University, No. 126, Jalan 19/155B, Bukit Jalil 57000, Kuala Lumpur, Malaysia. Tel.: +60 3 86567228; fax: +60 3 86567229.

Copyright © 2009 Elsevier Ireland Ltd. All rights reserved.