

Inhibitory effect of black ginger (*Kaempferia parviflora*) constituents on nitric oxide production

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Abstract

The inhibitory effect of *Kaempferia parviflora* (black ginger) constituents on nitric oxide (NO) production was examined. From the methanolic extract of *K. parviflora* rhizome, 16 flavones, 14 flavanones, 2 diarylheptanoids, 2 chalcones and a stilbene were isolated and their inhibitory activities toward NO production were examined. As a result, two methoxyflavones, 5,7,3',4'-tetramethyluteolin and 5,7-dimethoxyflavone showed significant activities. Most of the flavanone constituents, except for 5,7,3'-trimethoxy-4'-hydroxyflavanone, showed lower activities. The most potent active constituent of Black ginger was the chalcone flavokavin B; its derivative, flavokavin A, also showed significant activity. The curcumin and its derivative, 1-(4-hydroxyphenyl)-7-phenyl-1,6-heptadiene-3,5-dione, showed significant activity. Only one stilbene was isolated, and it showed low activity.

Keywords : inhibition of NO production, anti-inflammatory effect, black ginger, *Kaempferia parviflora*, polymethoxy flavonoid

I Introduction

Kaempferia parviflora Wall ex. Baker belongs to the Zingiberaceae and is called “black ginger” or “black turmeric” based on the color of its rhizome. *K. parviflora* grows in Thailand (Local name; *krachai dum*), and has been used in folk medicine as a tonic¹⁾. It has also been reported to have anti-cancer²⁾, anti-inflammation³⁾ and other bioactivities. Recently, its dietary properties^{4, 5)} have received some attention, and it has become a popular health food. Since Black ginger is on the list of raw materials that are not regarded as pharmaceuticals unless a medical property is proclaimed, which is maintained by the Ministry of Health, Labor and Welfare of Japan⁶⁾, and is thus at the border between pharmaceuticals and non-pharmaceuticals, many health food products containing black ginger can now be found in the Japanese market. However, imported Black ginger seems to vary considerably in quality, and therefore methods for maintaining quality control are necessary.

Polymethoxyflavonoids are known to be constituents of black ginger and may play a role in several of its pharmaceutical properties^{7, 8)}. While the anti-inflammatory activities of the constituents of black ginger have been examined, minor products have not yet been the target of large-scale extraction³⁾.

In this report, we describe the inhibitory activities of isolated constituents of black ginger including many minor compounds on nitric oxide production to evaluate its anti-inflammatory activity.

II Material and Methods

Instruments

An SCA-165DRS (Astec Co. Ltd.) CO₂ incubator was used for incubation. An xMark microplate reader (Bio-Rad Laboratories, Inc.) was used. NMR spectra were measured on a Bruker Ascend 600 (600 MHz). HPLC was performed on

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