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Introducing of green garlic plant as a new source of allicin

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ABSTRACT

The presence of allicin in green garlic plant extracts was investigated. Allicin in aqueous extracts from green garlic leaf, shoot and young bulbs were determined by HPLC. Allicin was present at highest level in extracts from whole green garlic plant at 0.48 ± 0.01 mg/mL, followed by that in shoot and leaf extracts at 0.44 ± 0.00 and 0.26 ± 0.01 mg/mL, respectively. The results obtained in this study offer green garlic as a new source of allicin, as green garlic plant is used as a favourite vegetable in many countries.

1. Introduction

Garlic (*Allium sativum*) has been a subject of considerable interest as a medicine world-wide since ancient times. Several lines of evidence through both *in vitro* and *in vivo* studies have revealed pharmacological potentials of garlic. *In vitro* studies demonstrated its antimicrobial (Ankri & Mirelman, 1999), antithrombotic, anticancer, anti-platelet aggregation and antioxidant (Corzo-Martínez, Corzo, & Villamiel, 2007) activities. *In vivo* studies, both in animal models and human clinical trials, have demonstrated beneficial effects of garlic in a large number of pathological conditions, including hyperlipidemia (Jabbari, Argani, Ghorbanihaghjo, & Mahdavi, 2005), cardiovascular disorders and arteriosclerosis (Rahman & Lowe, 2006). Cancer preventative properties of garlic have also been reported (Ejaz, Woong, & Ejaz, 2003). Epidemiologic studies have revealed the lower risk of stomach cancer in people with high garlic intake (Galeone et al., 2006).

Main pharmacological effects of garlic are attributed to its organosulphur compounds (Tapiero, Townsend, & Tew, 2004). Allicin is the chief biologically active component of garlic (Stoll & Seebeck, 1951). Allicin is not present in the intact plant, but is formed upon crushing of garlic bulbs due an enzymatic reaction between non-protein amino acid "alliin, a precursor molecule" and the enzyme alliinase. These molecules are originally present in intact garlic but kept in distinct compartments (Lanzotti, 2006). Allicin's biological effects were suggested to be due to its thiol-disulphide exchange reactions with the sulphydryl enzymes (Rabinkov et al., 1998) which has been confirmed by its blocking effect on the mammalian, parasitic and plant enzymes *in vitro* (Ankri et al., 1997; Juszkiewicz et al., 2004; Wills, 1956).

Although, there is controversy on stability of allicin in biological fluids (Freeman & Kodera, 1995), recently in a double-blinded, placebo-controlled study has shown allicin as a potential agent for reducing exercise-induced muscle damage in athletes (Su, Tian, Zhang, & Zhang, 2008). Additionally, it has been demonstrated that most of the other biologically active components present in garlic extract are derived from allicin (Brodnitz, Pascale, & Derslice, 1971). Thus, the beneficial effects of garlic is due to allicin content in garlic preparations.

All studies conducted on garlic, used root bulbs of the garlic plant. Garlic bulbs contain alliin and alliinase at about 1.7% and 2.8% of their dry weight, respectively (Lawson, 1996). Crushing of garlic bulbs produces high but variable amounts of allicin, ranging from 1.61% to 13.03% of their dry weight (Baghalian, Ziai, Naghavi, Naghdi Badi, & Khalighi, 2005). Few studies have evaluated the compositions and therapeutic values of other parts of garlic plant. Because of the paucity of research in this topic we conducted to evaluate the content of allicin in green garlic plant.

2. Materials and methods

2.1. Materials

Reagent grade standard allicin with a purity of 99.39% was purchased from LKT laboratories Inc. (St Paul, MN, USA) and stored at −70 °C until use. HPLC grade methanol and ethylparaben (99%

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