HOSTED BY
ELSEVIER
CrossMark
Available online at www.sciencedirect.com
ScienceDirect
Food Science and Human Wellness 4 (2015) 42–46
Food Science and Human Wellness
www.elsevier.com/locate/fshw

Evaluation of free radical scavenging activity of various extracts of leaves from *Kedrostis foetidissima* (Jacq.) Cogn.

Kalaisezhiyen Pavithra *, Sasikumar Vadivukkarasi

Department of Biochemistry, Centre for Biological Science, K.S. Rangasamy College of Arts and Science, Thokkavadi, Tiruchengode, Tamil Nadu, India

Received 10 December 2014; received in revised form 14 February 2015; accepted 23 February 2015

Abstract

The present study was aimed to investigate the *in vitro* free radical scavenging activity of various leaf extracts (aqueous, methanol, acetone chloroform and petroleum ether) of *Kedrostis foetidissima*. *In vitro* free radical scavenging activities of the extracts were assessed against DPPH and hydroxyl radicals. The metal chelating activity and reducing power ability of the extracts were also determined. The free radical scavenging activity was found to be high in methanolic extract for DPPH and hydroxyl radicals in a concentration dependent manner followed by chloroform, aqueous, acetone and petroleum ether extracts. The metal chelating activity and reducing power ability was also found to be high in methanolic extract. The difference in scavenging potential of the extracts may be due to variation in the percentage of phytoconstituents extracted in various solvents. Thus the result suggests that the methanolic leaf extract of *K. foetidissima* could serve as a potential source of antioxidants and can be explored as a therapeutic agent in free radical induced diseases.

Keywords: Free radicals; *Kedrostis foetidissima*; Antioxidants; Phenols; Scavenging activity

1. Introduction

Free radicals are fundamental to any biochemical process and represent an essential part of aerobic life and metabolism [1]. Reactive oxygen species (ROS) and reactive nitrogen species (RNS) are products of normal cellular metabolism. The most common ROS include superoxide anion, hydrogen peroxide (H_2O_2), peroxyl (ROO−) radicals and reactive hydroxyl (OH−) radicals and the nitrogen derived free radicals are nitric oxide and peroxynitrite anion (ONOO−) [2]. These reactive species play an important role in pathogenesis of several oxidative stress related diseases like carcinogenesis, cardiovascular diseases, rheumatoid arthritis, ulcerative colitis and neurological degenerative diseases [3]. It is possible to reduce the risk of chronic diseases and prevent disease progression by either enhancing the body's natural antioxidant defenses or by supplementing with dietary antioxidants [4]. Antioxidants offer resistance against oxidative stress by scavenging the free radicals, inhibiting the lipid peroxidation and by many other mechanisms and thus prevent the disease progression [5]. The most commonly used synthetic antioxidants at present are butylated hydroxyanisole, butylated hydroxytoluene, propyl gallate and tert-butylhydroquinone. However, they are suspected of being responsible for liver damage and acting as carcinogens in laboratory animals [6]. The search for new products with antioxidative properties and fewer side effects is very active domain of research. Therefore, the development and utilization of more effective antioxidants of natural origin is desirable [7]. Since ancient times, many official herbs have provoked interest as sources of natural products. They have been screened for their potential uses as alternative remedies for the treatment of any infections and preservation of foods from the toxic effects of oxidants [8]. Novel natural antioxidants from some plants have been extensively studied in the past few years for their antioxidant and radical scavenging properties [9]. *Kedrostis foetidissima* belong

* Corresponding author at: Department of Biochemistry, Centre for Biological Science, K.S. Rangasamy College of Arts and Science, Thokkavadi, Tiruchengode, Tamil Nadu, India. Tel.: +91 9976168293.
E-mail address: kanupavithra@gmail.com (K. Pavithra).
Peer review under responsibility of Beijing Academy of Food Sciences.

http://dx.doi.org/10.1016/j.fshw.2015.02.001

to the family of Cucurbitaceae, traditionally the plant was found to be effective in treatment of diarrhea, measles, asthma, small pox and opportunistic infections. The present work was aimed to evaluate the *in vitro* free radical scavenging activity of various leaf extracts of *K. foetidissima*.

2. Materials and methods

2.1. Collection of plant materials

The leaves of *K. foetidissima* were collected from Sivagiri, Tamilnadu, India during the month of January 2012 and authenticated by Dr. K. Nandakumar, Professor, Department of Botany, Kandaswami Kandars College, Velur, Namakkal (dt), Tamilnadu (Fig. 1). The leaves were washed with distilled water, shade dried and powdered with the mechanical grinder to a particle size of 100 μm. The powder was stored in an airtight container until further use. The moisture content was determined by drying 5 g of samples at 60 °C in a drying oven to a constant weight.

2.2. Chemicals

Chemicals used in the study were ascorbic acid, gallic acid, tannic acid, butylated hydroxyl toluene, 2,2-diphenyl-1-picrylhydrazyl radical (DPPH), ferric chloride, sodium phosphate, ammonium molybdate, ferrous ammonium sulphate, ethylenediaminetetraacetic acid (EDTA), dimethyl sulphoxide (DMSO), ammonium acetate, glacial acetic acid, trichloroacetic acid, sodium dihydrogen phosphate, disodium hydrogen phosphate and ferrozine. All the chemicals were purchased from Merck, India and all solvents used were of analytical grade.

2.3. Extraction of plant material

K. foetidissima (30 g) in powdered form were extracted with 200 mL of various organic solvents (water, methanol, acetone, chloroform and petroleum ether) using shaker in 200 r/min speed for 24 h at 37 °C. The extracts were filtered with Whatman No. 1 filter paper for every 3 h. Then the collected extracts were combined and kept in an oven at 40 °C for removal of residual moisture. The dried extracts were weighed to determine the percentage yield of the soluble constituents using the formula:

$$\%\ \text{Yield} : \frac{\text{Weight of dry extract}}{\text{Weight taken for extraction}} \times 100.$$

The dried extracts were stored at 4 °C for further investigation of potential *in vitro* free radical scavenging activity.

Fig. 1. *Kedrostis foetidissima*.

2.4. In vitro free radical scavenging activity

2.4.1. DPPH radicals scavenging assay

DPPH radical is a widely used method to evaluate the free radical scavenging ability of natural compounds. This assay is based on the measurement of the scavenging ability of antioxidant substances toward the stable radical. The free radical scavenging activity of the extracts was examined *in vitro* using DPPH radical as described by Shimada et al. [10] with slight modification. 1.0 mL of various concentrations of extracts (2–10 mg/mL) was mixed with 1.0 mL of 0.8 mmol/L DPPH solution. The mixture was shaken vigorously and left to stand for 30 min and the absorbance was measured at 517 nm against a reagent blank. Gallic acid and BHT were used as standards. The inhibition percentage for scavenging DPPH radical was calculated according to the equation:

$$\%\ \text{decolorization} = \left[1 - \left(\frac{\text{ABS}_{\text{sample}}}{\text{ABS}_{\text{control}}}\right)\right] \times 100$$

2.4.2. Reducing power assay

The reducing power ability of the extracts was evaluated by the method described of Oyaizu [11]. The reaction mixture contained 1.0 mL of various concentrations of extracts (2–10 mg/mL), 2.5 mL of 1% potassium ferricyanide and 2.5 mL of 0.2 mol/L sodium phosphate buffer. The mixture was incubated at 50 °C for 30 min and the reaction was terminated by the addition of 2.5 mL of 10% trichloroacetic acid, followed by centrifugation at 3000 r/min for 10 min. 2.5 mL of the upper layer was mixed with 2.5 mL of deionized water and 0.5 mL of 0.1% ferric chloride. The absorbance was measured at 700 nm against blank that contained distilled water and phosphate buffer. Increase in absorbance indicates increased reducing power of the sample. BHT was used as standard.

2.4.3. Chelating ability on ferrous ions

The ferrous ion chelating potential of the extracts was evaluated by Dinis et al. [12] method. The reaction mixture contained 1.0 mL of various concentrations of the extracts (2–10 mg/mL) and 0.05 mL of 2 mmol/L $FeCl_3$. The reaction was initiated by the addition of 0.2 mL of 5 mmol/L ferrozine. The reaction mixture was shaken vigorously and left standing at room temperature for 10 min and the absorbance of the reaction mixture was measured at 562 nm against a reagent blank. A lower absorbance of the reaction mixture indicated a higher Fe^{2+} chelating ability. The control contained all the reagents except sample. Gallic acid and ascorbic acid was used as standard.