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ANTIOXIDANT ACTIVITY OF METHANOL EXTRACT OF *ZINGIBER OFFICINALE* GROWN IN NORT INDIAN PLAINS

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ABSTRACT

The present investigation evaluates the antioxidant activity of methanol of extract of *Zingiber officinale* (family-*Zingiberaceae*).The hydrogen donating ability of methanol extract of ginger was measured by reduction of DPPH and potassium ferricyanide. It was observed that the antioxidant activity of methanol extract increases proportionately with concentration.

Key words: *Zingiber officinale*, DPPH, ascorbic acid, BHT, antioxidant activity.

INTRODUCTION:

Zingiber is a genus of plants belonging to the Zingiberaceae, one of the important family in this region.It is widely distributed throughout tropical and subtropical regions, paricularly south-east Asia. Plants in this genus have variety of uses as foodstuff, spices, in traditional medicines *etc.* [1, 6] Some *Zingiber* species also exhibit antioxidant[11] and antimicrobial activities[2,9]. Now-a-days there has been an increasing demand for safer natural antioxidants in the food industry and other applications. This has caused a renewed interest in natural products that have been used for centuries for a variety of reasons, here we are studying the antioxidant activity in a common spice used in Indian ginger *i.e. Zingiber officinale*. Its methanol extract has been selected for determining the antioxidant activity and compared with common antioxidants BHT (Butyl hydroxy toluene) and ascorbic acid.

MATERIALS AND METHODS:

1, 1-Diphenyl-2-picrylhydrazyl (DPPH) ascorbic acid, potassium ferricyanide, $FeCl_3$ and Trichloroacetic acid (TCA) . All chemicals used including solvents were of analytical grade.

1) PREPARATION OF METHANOLIC EXTRACT

The fresh rhizomes of ginger (*Zingiber officinale)* were dried and powdered. About 100g of dried plant material was taken and soaked in methanol (1L of 98%) for 5-7 days. The soaked material was stirred every 24 hrs using sterilized glass rod. Final extract was passed through Whatman filter paper No.1 (Whatman Ltd, England).The filtrate obtained was concentrated on a rotary evaporator at 40^0C and stored at 4^0C till further use. A stock solution was prepared in methanol. Working solutions were prepared from 50-200 μg extract/ ml using suitable dilutions.

Dr. Reena Lawrence

Completed research work from Central Institute of medicinal and Aromatic plants (CSIR) and presently working as Assistant Professor (Senior Grade) in Sam Higgon Bottom Istitute of Agriculure, Technology and Science (Deemed to be University),Allahabad, My work includes study of natural products including essential oils, isolation and characterization of compounds.Then study of antimicrobial and antioxidant activity.

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Presently working as Head, Bio-chemistry and Biochemical Technology in Sam Higgon Bottom Istitute of Agriculure, Technology and Science (Deemed to be University), Allahabad. Present resesrch work includes study of metabolism of plants under abiotic stress and also utilization of soil fungi for cellulose degradation.

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Completed her M.Sc. from M.J.P. Rohilkhand University, Bareilly, presently Ph.D scholar in chemistry dept in Sam Higgon Bottom Istitute of Agriculure, Technology and Science (Deemed to be University), Allahabad. Reserach are includes work of natural products with special stress on Essential oil Research.

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2) DETERMINATION OF DPPH RADICAL SCAVENGING ACTIVITY

The antioxidant activity of methanol extract of ginger was assessed o the basis of radical scavenging effect of stable DPPH free radical [4]. The diluted working solutions of test extracts were prepared in methanol (50-200µg/ml). Ascorbic acid was used as standard. The DPPH solution was prepared in methanol at a concentration of 0.002% and 1ml of the working solutions was mixed with 1ml solution of DPPH. These solutions were kept in dark for 30 min. Later, optical density was recorded at 517nm using UV-Visible spectrophotometer. DPPH in methanol was used as control. Optical density was recorded and inhibition percentage was calculated using the formula

% Inhibition of DPPH activity = A-B/A **x** 100

Where: A: Optical Density of control

B: Optical density of sample

3) ASSAY OF REDUCING POWER

In this method [3,10] different extracts (50-200µg/ml) were taken in different tubes and volume of all the working solutions is made up to 1ml by adding water, added 2.5 ml Phosphate buffer (0.2M, pH 6.6)and 2.5 ml of potassium ferricyanide (1%).The mixture was incubated for 20 min. at 50^0C. Added 2.5 ml TCA (Trichloroacetic acid) to each mixture and centrifuged for 10 min. at 3000 rpm. The upper layer (2.5ml) was mixed with distilled water and 0.5ml $FeCl_3$ (0.1%). Absorbance was measured at 700nm against a blank using UV-Visible spectrophotometer. Increased absorbance of reaction mixture indicates increase in reducing power.

RESULTS AND DISCUSSION:

Natural antioxidants that are present in herbs and spices are responsible for inhibiting or preventing the deleterious consequences of oxidative stress. Spices and herbs contain free radical scavengers like polyphenols, flavoids *etc*. [4]. In the present paper evaluation of free radical scavenging activity of methanolic extract of ginger has been done for evaluation. Two methods have been considered

(i) DPPH METHOD

The molecule of DPPH (á,á-diphenyl-â-picrylhydrazyl) is characterized as a stable free radical by virtue of delocalization of spare electron over the molecule as a whole and it gives a deep violet color to the molecule and an absorption band in ethanol solution at 517nm.When it reacts with a substance donating hydrogen atom it goes in pale yellow reduced form[8]:

$Z^{\cdot} + AH = ZH + A^{\cdot}$

The reduction capability of DPPH radical was determined by decrease in its absorbance at 517nm which is induced by antioxidant [6]. Fig. 1 illustrates significant decrease in the concentration of DPPH radical due to scavenging ability of methanol extract; here ascorbic acid has

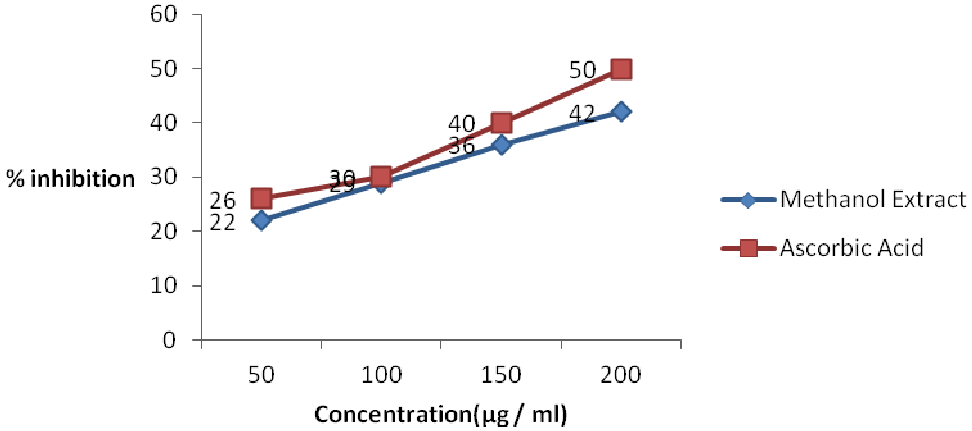

Figure 1: Antioxidant activity in Methanolic extract of Ginger rhizomes by DPPH method

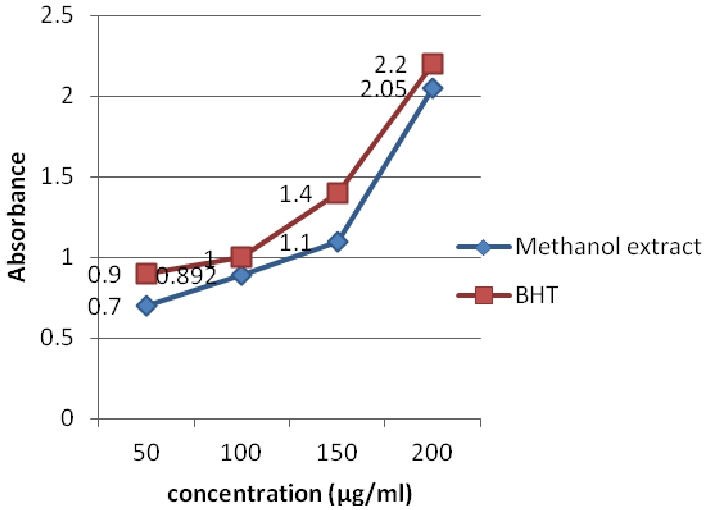

Figure 2: Antioxidant activity in Methanolic extract of Ginger rhizomes by Reducing Power method

been used as reference, which exhibited maximum activity at all concentrations. Methanolic extracts of ginger at 100µg/ml, the activity was at par to that of reference, inhibition percentage inhibition here is 29.

(ii)**REDUCING POWER**

This represents the reducing ability of methanol extract of ginger as compared with BHT. The reducing ability has been judged through standard method. This is investigated through conversion of Fe^{3+}into Fe^{2+}, this ability may serve as a significant indicator of its potential as antioxidant [5]. Reducing power of the diluted extract has been found to be significant ($p<0.01$) and as good as BHT. The reducing power has been found to increase with increasing amount of sample. At all the concentrations there was significant activity as compared to control and these differences were statistically significant.($p<0.01$).

REFERENCES:

Chairgulprasert, V., Prasertsongskun, S. and Wichaporn, W.(2005).Chemical constituents of essential oil and antibacterial activity of *Zingiber wrayi* var. *halabala. Songklarakarin, J. Sci .Technol.***27**:813-818.

Habsah, M., Amran, M., Mackeen, M.M., Lajis, N.H., Kikuzaki, H., Nakatani, N., Rahman, A. A. and Ali, A. M. (2000).Screening of Zingiberaceae extracts for antimicrobial and antioxidant activities. *J. Ethnopharmocol*. **72**:403-410.

Huda-Faujan, N., Noriham, A., Norrakiah, A. S. and Babji, A. S.(2009). Antioxidant activity in plants methanol extract containing phenolic compounds. *African J. Biotech.*. **8**: 484-489.

Khalaf, N. A., Shakya, A. K., Othman, A. A., El-Agbar, Z. and Farah, H. (2008). Antioxidant activity of some common plants. *Turk .J. Biol*. **32**: 51-55.

Meir, S., Kanner, J., Akiri, B. (1995). Determinaton and involvement of aqueous reducing compounds in oxidative defense system of various senescing leaves. *J. Agric. Food Chem.* **43**: 1813-1815.

Molyneux, P. (2004).The use of stable free radical diphenyl picryl hydrazyl (DPPH) for estimating antioxidant activity .*Songklarakarin, J. Sci. Technol.* **26**:211-219.

Politeo, O., Jukie, M.and Milos, M. (2006).Chemical composition and antioxidant activity of Essential oil of 12 spice plants. *Croatica Chemica Acta*. **79**:542-552.

Rajeshwar, Y., Kumar,G. P. S., Gupta M. and Mazumdar,U. K.(2005).Studies on in vitro antioxidant activity of methanol extract of *Mucuna pruriens* (*Fabaceae*) seeds. *Europ. Bullet. Drug Res.*.**13**:31-39.

Singh, G., Kapoor, I. P., de Heluani, C. S., de Lampasona, M. P. and Catnlan, C. A. (2008). Chemistry, antioxidant and antimicrobial investigation on essential oil and oleoresin of *Zingiber officinale .Food and Chem. Toxicol.,* **46** *:* 3295-3302.

Yildrin, A., Oktay, M., Bulaloulu, V.(2001).The antioxidant activity of leaves of *Cydonia vulgaris*. *Turk. J. Med. Sci*. **31**: 23-27.

Yuan, L. C., Wen, C. J. and Hsien, C. W. (1982).Studies on the antioxidant activity of spices grown in Taiwan. *Chung-Kuo Nung Yen hua Hsuch Hui Chih*. **20**: 61-66.