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PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF RHIZOME PART OF *CURCUMA ZEDOARIA*

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ABSTRACT
Curcuma zedoaria belongs to the family *Zingiberaceae*. The rhizome parts of *Curcuma zedoaria* was dried, extracted with different solvent by soxhlet extraction method. Phytochemical studies of all the crude extracts showed the presence of terpeniods, alkaloids, saponins, flavanoids, glycosides & carbohydrates, phenolic, tannins and phytosterols etc., The phytochemical results confirm that all extracts contains more important chemical constituents for various biological activities. Antioxidant activity (DPPH) has been carried out for all the crude extracts of *Curcuma zedoaria*. From the results, it was found that the different crude extracts from the rhizome part of the plant material had shown potent antioxidant activity. The Maximum antioxidant activity was seen in Ethyl acetate, n-hexane and water extracts, whereas petroleum ether, chloroform and ethanolic extracts of the plant material had shown moderate antioxidant activity. The present paper deals with the phytochemcial screening and antioxidant activity for all crude extracts of the plant material.

KEYWORDS: Antioxidant activity, Phytochemical screening, Soxhlet extraction, DPPH Method, *Curcuma zedoaria*.

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INTRODUCTION

Curcuma zedoaria belongs to the family *Zingiberaceae*. The species are widely grown in India and are mainly used for their starch, which has medicinal properties[1]. The tubers are used as a carminative, digestive stimulant and in treatment of colds and infections. They exhibit both antibacterial and antifungal activity.[2,3] The essential oils from *Curcuma zedoaria*, obtained by steam distillation of dried tubers from an active ingredient in antibacterial preparations[4,5].There is no reports for antioxidant activity of all the crude extracts of the rhizome part of the plant material.

Antioxidant compounds in food play an important role as a health protecting factor. Scientific evidence suggests that antioxidants reduce the risk for chronic diseases including cancer and heart disease[6-10].The potentially imprudent derivatives of oxygen, endorsed as ROS (Reactive oxygen species) such as O_2^-, H_2O_2 and OH radical are incessantly generated within the human body, if ROS overproduction (or) derisory antioxidant argument, this equilibrium is hindered favoring the ROS gain that culminates in oxidative hassle. The ROS readily attack and induce oxidative damage to various biomolecules including proteins, lipids, lipoproteins and DNA. This oxidative damage produce a lot of chronic human diseases like diabetes mellitus, cancer, atherosclerosis, arthritis, and neurodegenerative diseases etc., nowadays more interest has been shown in the field of free radical biology, because the reason is to avoid the causes of chronic human diseases[11-14]. Epidemiological studies have brought into being that the intake of antioxidants such as Vitamin-C (ascorbic acid) reduces the risk of coronary heart disease and cancer. Researchers had shown more interest to isolate antioxidant rich compounds in the natural sources like marine organisms; plant etc., Hence an attempt has been made to extract the phytoconstituents present in the rhizome part of the plant material *Curcuma zedoaria* and tested for its antioxidant activities.

MATERIAL AND METHODS

Plant Material

The dried rhizome part of the plant material *Curcuma zedoaria* was collected from southern part of Orissa, during the month of November 2008. The voucher specimen was prepared and deposited in the herbarium section of the VIT University. The rhizome part of *Curcuma zedoaria* was washed with distilled water, shade dried, powdered, and stored in an airtight container for further use.

Preparation of plant extracts

About 100g of the air dried powered plant material – *Curcuma zedoaria* are extracted successively with the following solvents in soxhlet extractor, and identified as fractions 1 to 5 as shown below; n-hexane - Fraction-1, Petroleum ether - Fraction-2, Chloroform - Fraction-3, ethyl acetate - Fraction-4 and Ethanol - Fraction-5. Every time before extracting with the next solvent, the plant material was dried in air oven below 50^0C. The residue is then macerated with chloroform- water for 24 hrs and aqueous layer is obtained. Each extract is concentrated by distilling off the solvent and then evaporating to dryness. The extracts obtained are subjected to qualitative test for the identification of various phyto-constituents.

Phytochemical analysis of the extract:

Standard procedures were followed to identify the phytochemical constituents present in different crude extracts of the plant material as described by J.B Harborne[15]. Qualitative Screening of Phytochemicals from *Curcuma zedoaria*[16] is shown in **Table-1**.

PREPARATION OF DPPH SOLUTION

DPPH solution (0.1mM) was prepared in methanol by dissolving 1.9 mg of DPPH in methanol and the remaining volume was made up to 100ml with methanol. The solution was kept in darkness for 30 minutes to complete the reaction.

The free radical scavenging activity of the crude plant extracts was determined by the 1,1-diphenyl-2-picryl-hydrazil (DPPH). This antioxidant activity was measured by following the standard method described by *Ilhami et al*[17] wherein the bleaching rate of a stable free radical, $DPPH^{\cdot}$ is monitored at a characteristic wavelength in the presence of the sample. In its radical form, DPPH absorbs at 517 nm, but upon reduction by an antioxidant or a radical species its absorption decreases. Briefly, 1 mL of 0.1 mM

methanolic solution of DPPH was added to 3 mL of the crude extract F1-F6, at different concentration (10, 20, 50, 75, 100 µg/mL). The samples were kept in the dark for 30 min after which the absorbance was measured at 517 nm in a UV spectrophotometer (Double beam spectrophotometer Hitachai-U2800). Lower absorbance of the reaction mixture indicates higher free radical scavenging activity. Butylated Hydroxy Toluene (BHT), which is a good antioxidant, is taken as a standard in this study.
The capability to scavenge the DPPH radical was calculated using the following equation:
DPPH Scavenging effect (%) = $[(A_o-A_s)/A_o)*100]$

RESULTS AND DISCUSSION

The phyto-chemical screening of the crude plant extracts showed the positive reaction for Alkaloids, flavonoids, phenolic, terpeniods, and phytosterols etc. For the crude plant extracts antioxidant activity has been carried out by DPPH method. The ethanolic, ethyl acetate and water extracts of *Curcuma zedoaria* had shown potent antioxidant activity. The concentration of 100 µg/ml of ethanolic, ethyl acetate and water extracts of rhizome part of the plant material exhibited 85.41, 97.9 & 98.95 percent inhibition of DPPH free radicals respectively, whereas the concentration 100 µg/ml of petroleum ether and ethanolic extracts of rhizomes exhibited 51.04 & 43.75 moderate percent inhibition of DPPH free radicals respectively. Due to the presence of bioactive compounds in each extracts its shown potent antioxidant activity.

CONCLUSION

The present study suggests that crude extracts of *Curcuma zedoaria rhizomes* possess potent antioxidant activity. Therefore it is suggested that *Curcuma zedoaria* could be a potential source of natural antioxidants that could have great importance as therapeutic agent in preventing or slowing down the progress of ageing and age associated oxidative stress related degenerative diseases. Further research is recommended for better characterization of important active constituents, responsible for antioxidant activity. The revealed antioxidant property of extracts may provide potential therapeutic intervention against oxidative threats and degenerative disorders.

REFERENCES

1. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A Handbook of Medicinal Plants, Agrobios, India, 2003, p.181.
2. Anonymous, The Wealth of India—Raw Materials IA (Revised): A Dictionary of Indian Raw Materials and Industrial Products, vol. 69.CSIR, New Delhi, 1985, p. 401–406.
3. Ficker CE, Smith ML, Susiarti S, Leaman DJ, Irawati C, Arnason JT. Inhibition of human pathogenic fungi by members of Zingiberaceae used by the Kenyah (Indonesian Borneo). Journal of Ethnopharmacology 2003; 85: 289–293.
4. Gupta SK, Banerjee AB, Achari B. Isolation of ethyl p-methoxycinnamate, the major antifungal principle of Curcuma zedoaria. Lloydia 1976; 39: 218–222.
5. Joshi S, Singh AK, Dhar DN. Isolation and structure elucidation of potential active principles of Curcuma zedoaria rhizomes. Herba Hungarica 1989; 28: 95–98.
6. Farber JL. Mechanisms of cell injury by activated oxygen species, Environ. Health Pers. 1994; 102: 17-24.
7. Hogg N, Free radicals in disease, Semin. In Reprod. Endocrin 1998; 162:41–88.
8. Marchioli R, Schweiger C, Levantesi G, Tavazzi L, Valagussa F. Antioxidant vitamins and prevention of cardiovascular disease:epidemiological and clinical trial data. Int J of Pharm Sci Rev and Res. 2001; 36:53–63.
9. Robak J, Marcinkiewicz E, Scavenging of reactive oxygen species as the mechanism of drug action. Pol. J. Pharmacol 1995; 47:89–98.
10. Madhavi DL, Salunkhe DK, Deshpande SS, Toxicological aspects of food antioxidants, Food antioxidants. New York: 1995: 267.
11. Larson RA, The antioxidants of higher plants, Phytochemistry 1998; 27:969–78.

12. Ohira S, Hasegawa T, Hayasahi KI, Hoshino T, Takaoka D, Nozaki H, Sesquiterpenoids from Cyperus rotundus, Phytochemistry 1998; 47:577- 579.
13. Mekem SM, Koing WA, Study of essential oil of Cyperus rotundus, Phytochemistry 2001; 58: 799- 80.
14. Elmastas M, Radical Scavenging activity and Antioxidant capacity of the BL extracts, Journal of the Iranian Chemical Society 2006; 3:258-266.
15. J. B. Harborne, Phytochemical Methods. Second edition, by. Chapman and Hall, London and New York. ISBN 0-412-25550-2 1984. p. 288.
16. Ilhami Gulcin, Sukru Beydem, H. Ahmet Alici, Mahfuz Elmastas, M. Emin Buyukokuro glu. A comparative study on the antioxidant activity of fringe tree (Chionanthus virginicus L.) extracts, Journal of Pharmacological Research 2004; 49:59–66.
17. Kokate CK, Practical Pharmacognosy, VPBN 14, 1996, New Gian Offset Printers, Delhi.

Table 1: Qualitative Screening of Phytochemicals from *Curcuma zedoaria*

Phyto constituents	n-hexane	Pet ether	Ethyl acetate	Ethanol	Chloroform	Water
Terpeniods	-	+	-	-	+	-
Alkaloids	-	-	-	+	+	+
Phenolic and tannins	-	-	+	-	-	+
Flavaniods	+	-	-	+	-	-
Saponins	-	-	-	+	-	-
Carbohydrates & Glycosides	-	-	-	+	-	+
Phytosterols	-	+	-	+	-	-

+ = Presence; - = Absence

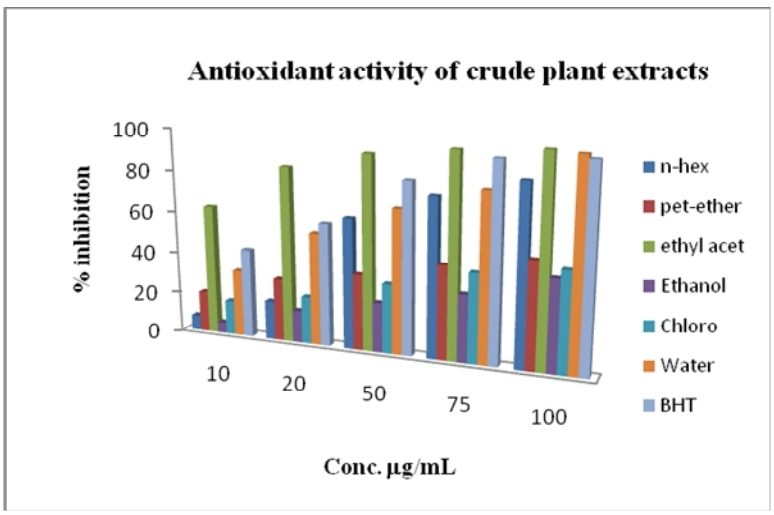

Figure 1: Showing % inhibition of free radicals by different crude extracts

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