INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

IN VITRO BIOEVALUATION OF ANTIOXIDANT ACTIVITY IN *CURCUMA CAESIA*

PRASANTHI DONIPATI[1], DR. S. HARA SREERAMULU[2]

1. Research Scholar, Dr. V. S. Krishna Govt. College, Visakhapatnam, A.P, India - 530 013.
2. Professor & Head of the Dept. of Biotechnology, Dr. V. S. Krishna Govt. College, Visakhapatnam, A.P, India-530 013

Accepted Date: 17/09/2015; Published Date: 27/10/2015

Abstract: *Curcuma caesia* is commonly known as kali haldi and it belongs to the family Zingiberaceae. This herb is available throughout north-east, central India, Papi Hills of East Godavari, West Godavari, and Andhra Pradesh. In the traditional system of medicine, fresh and dried rhizomes of *Curcuma caesia* Roxb are used. The present study was undertaken to compare the antioxidant activity of hexane, chloroform and methanolic extract of rhizomes between PHENOLS, ferric-reducing antioxidant power assay (FRAP), IRON REDUCTION TEST, Diphenyl picrial hydrazyl radical scavenging assay (DPPH). A graph is plotted between enzymatic, non enzymatic antioxidant levels and concentration. The results showed that, IRON REDUCTION TEST has more hexane, chloroform and methanolic concentrations than Diphenyl picrial hydrazyl radical scavenging assay (DPPH), PHENOLS, ferric-reducing antioxidant power assay (FRAP).

Keywords: *Curcuma caesia*, PHENOLS, (FRAP), IRON REDUCTION TEST, (DPPH).

Corresponding Author: MS. PRASANTHI DONIPATI

Access Online On:

www.ijprbs.com

How to Cite This Article:

Prasanthi Donipati, IJPRBS, 2015; Volume 4(5): 179-184

PAPER-QR CODE

INTRODUCTION

The genus *curcuma* (family zingiberaceae) comprises of more than 80 species of rhizomatous herbs. They occur in wild and cultivated forms and are widely distributed throughout the tropics of Asia, Africa and Australia [1]. *Curcuma caesia* is commonly known as black turmeric which is a an erect rhizomatous herb with large leaves found throughout the Himalayan region, north-east and central India. The paste of rhizome is used traditionally for the treatment of leucoderma, asthma, tumor, piles etc. Essential oil of *C. Caesia* has been known for its antifungal activity [2] It is Fresh rhizomes are aromatic with intense camphoraceous odor and are applied externally to sprain and bruises[3] It rhizomes is used for migraine, 2-4 drops of fresh juice is poured in nose. For longevity, impotence, infertility, irregular menstrual flow, a spoonful powder from dried rhizomes is mixed with a spoonful of honey or a cup of milk is taken twice a day. For gastric troubles, a fresh piece of rhizome is chewed [4]. The rhizomes of kali haldi have a high economical importance because of its putative medicinal properties. The rhizomes are used in the treatment of smooth muscle relaxant activity [5]. Haemorrhoids, leprosy, asthma, cancer, epilepsy, fever, wound, vomiting, menstrual disorder, anthelmentic, aphrodisiac, inflammation, gonorrhoeal discharges, etc [6]. The inner part of the rhizome is bluish-black in colour and emits a characteristic sweet smell, due to presence of essential oil [7]. In present study we have evaluated the antioxidant potential of various solvent extracts of Curcuma caesia for antioxidant capacity assay.

MATERIAL AND METHODS

Collection of Plant Material: The plant material used in present study was collected from (Gudala, Allavaram and Amalapuram) Andhra Pradesh. The plant materials were further identified in the Department of Botany, Dr.V.S.Krishna College, Visakhapatnam, India.

Preparation of plant extracts:

The rhizomes were cut into pieces and air dried at room temperature. The dried rhizomes were coarsely powdered and successfully extracted with methanol using Soxhlet extractor at a temperature of 55-60 0C for a period of 7-8 hrs and concentrated to dryness (crude extract). Extracts were filtered using Whatmann No.1 filter paper. The dried extract was weighed and then stored in a freezer. The crude extract was used for the experiments.

Antioxidant capacity assay:

Ferric reducing or Antioxidant power assay(FRAP)

The total antioxidant power of the plant sample was assayed by the method as described earlier by [8]. The FRAP method for measuring the ferric reducing power (reduce the TPTZ-

Fe(III) complex to TPTZ-Fe(II) complex ability) of plasma(FRAP) or plant extract. In the present FRAP assay, an aliquot of the samples (10-40 µl) was mixed. with 3 ml of ferric-TPTZ-Fe(ii) reagent. The change in the absorbance was measured at 593 nm after initial mixing and up to 90 min. until it reached a plateau. Aqueous solution of known Fe (II) conc. (Feso4.7H2o) were used for calibration of the FRAP assay and Antioxidant. The results expressed as FRAP units.

Diphenyl picrial hydrazyl radical scavenging assay (DPPH)

The DPPH (Diphenyl picrial hydrazyl) radical scavenging assay was carried out as described earlier by [9]. 5.0 ml of DPPH solution (0.004%) in methanol was added to 50 µl of plant extract. After 0.5 hrs of incubation period at room temperature, the absorbance was read against a blank containing a sample and methanol at 517 nm. Control containing the buffer and regent was carried out. Similarly positive controls are treated in the same way as test sample replaced by positive control. Butyl hydroxyl touline (BHT) used as positive control. Inhibition (I) Diphenyl picrial hydrazyl radical in present was calculated I the following way. Percentage of Inhibition (I) = Absorbance of control - Absorbance of test / Absorbance of control × 100.

Total phenolic compound analysis

The total phenolics were determined using the folin cio-caiteau reagent as reported by [10]. To 50 µl of each sample, 2.5 ml of folin cio-caiteau reagent and 2.5 ml of 7.5%(w/v) Na2CO3 was added and incubated at 45°C for 15 min. the absorbance values of all samples were measured in a spectrophotometer at 765 nm. The results were expressed as mg of Gallic acid equivalent per gm weight.

Iron(III) to iron(II)-reducing activity

The ability of the extracts to reduce iron (III) was assessed by the method of [11]. A 1-ml aliquot of each extract, dissolved in water, was mixed with 2.5 ml of phosphate buffer (0.2 M, pH 6.6) and 2.5 ml of a 1% aqueous potassium hexacyanoferrate [K3Fe (CN) 6] solution. After a 30 min incubation at 50 C, 2.5 ml of 10% trichloroacetic acid were added, and the mixture was centrifuged for 10 min. A 2.5-ml aliquot of the upper layer was mixed with 2.5 ml of water and 0.5 ml of 0.1% aqueous FeCl3, and the absorbance was recorded at 700 nm. Iron (III) reducing activity was determined as ascorbic acid equivalents (mmol ascorbic acid/g extract). The values are presented as the means of triplicate analyses.

RESULTS AND DISCUSSIONS

Free radicals are the cause for several major disorders. So, evaluation of antioxidant activity in plants could result in the discovery of natural antioxidants with pharmacological and food value. The importance of phenol compounds in plants as natural antioxidants and their use as

substitutes to synthetic antioxidants in food additives is well known [12]..DPPH radical was used as a stable free radical to determined antioxidant activity of natural compounds [13]. The antioxidant activity of plant extracts containing polyphenol components is due to their capacity to be donors of hydrogen atoms or electrons and to capture the free radicals [14]. Thus, the purple colour of 2, 2-diphenyl-1-picryl hydrazyl (DPPH) will reduce to α, α-diphenyl-β-picrylhydrazine (yellow coloured) [15]. According to [16] scavenging of the stable radical (DPPH) is considered a valid and easy assay to evaluate scavenging activity of antioxidants. In this study, the antioxidant activity is also determined on the basis of the ability of antioxidant in this plants extracts to reduce ferric (III) iron to ferrous (II) iron in FRAP reagent [17][18]. A graph is plotted between enzymatic, non enzymatic antioxidant levels and concentrations of extracts shown in Fig 1. The results showed that, IRON REDUCTION TEST has more hexane, chloroform and methanolic concerntrations than Diphenyl picrial hydrazyl radical scavenging assay (DPPH). In PHENOLS and FRAP, hexane, chloroform and methanolic concentrations are less when compared to IRON REDUCTION TEST and DPPH. There was a good correlation between IRON REDUCTION TEST and antioxidant activity (DPPH) that support the idea of phenols as contributor of the antioxidant power of plants extracts.

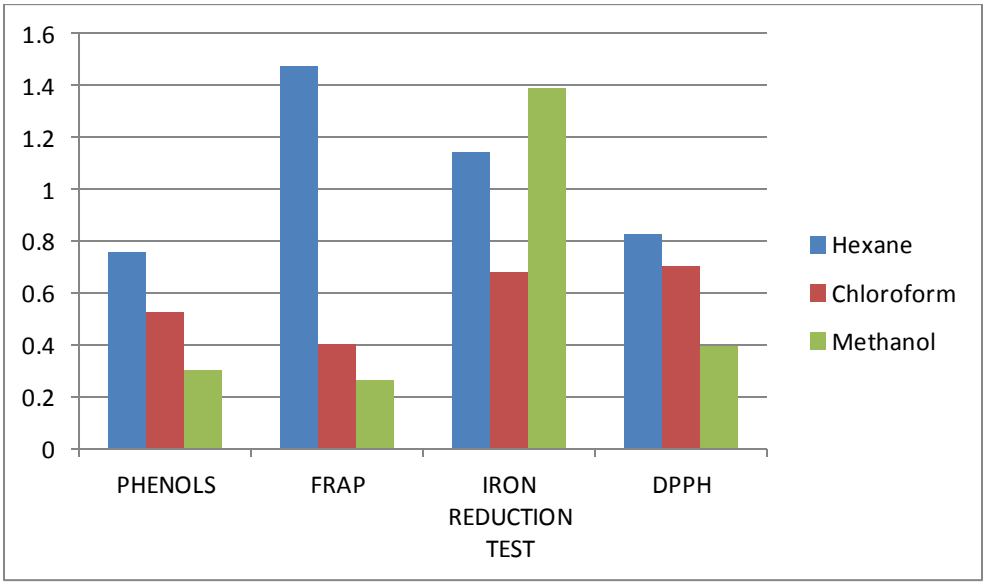

Fig 1. The correlation between solvent extracts of PHENOLS, FRAP, IRON REDUCTION TEST and DPPH activity.

CONCLUSION

The present study emphasizes the knowledge on the plant *Curcuma caesia* Roxb. The rhizomes of the plant have enough bioactive properties as shown in the different animal model. The phytoconstituents are also proved to be identified. The results showed that, IRON REDUCTION

TEST has more hexane, chloroform and methanolic concerntrations than Diphenyl picrial hydrazyl radical scavenging assay (DPPH), PHENOLS, ferric-reducing antioxidant power assay (FRAP). This data may signify the investigations of different bio-active compounds from the plant *Curcuma caesia* Roxb and the requisite level of activity (pharmacological & toxicological) would be considered for further scrutiny to develop the potential drug molecule.

REFERENCES

1. Angel GR, Vimala B and Bala Nambisan Antioxidant and Antimicrobial Activity Of Essential Oils From Nine Starchy *Curcuma* Species IJCPR 2012 4(2).
2. Dhal Y, Deo B and Sahu R K Comparative Antioxidant Activity of Non-Enzymatic And Enzymatic Extracts Of *Curcuma Zedoaria, Curcuma Angustifolia* And *Curcuma Caesia. IJPAES 2012 2(4).*
3. Velayudhan, K.C., Muralidharan, V.K., Amalraj, V.A., Rana, R.S., Singh, B. and Thomas, T.A. Genetic resources of *Curcuma*. NBPGR, Thrissur: 1994, 1 74p
4. Mangla M*,. Shuaib M, Jain J and Kashyap M *Vitro* Evaluation of Antioxidant Activity Of *Curcuma Caesia* Roxb. - IJPSR 2010, 1(9).
5. Arulmozhi DK, Sridhar N, Veeranjaneyulu A and Arora KS. Preliminary Mechanistic studies on the smooth muscle relaxant effect of hydroacloholic extract of Curcuma caesia. Journal of Herbal Pharmacotherapy 2006;6:(3/4).
6. Sasikumar B. Genetic resource of Curcuma: diversity, characterization and utilization. Plant Genet Resource 2005;3:230-251.
7. Pandey AK and Chowdhary AR.Volatile constituents of rhizome oil of Curcuma Caesia. Flavour Fragr J.2003;18:463–5.
8. Benzie I.F.F and Strain J.J, Anal. Biochem, 1996, 239, 70.
9. Cuendet M, Hostettmann K and Potterat O, Helv. Chim. Acta, 1997, 80, 1144.
10. Javanmardi J, Stushnoff C, Locke E and Vivanco, Food chem, 83, 547-550.
11. Oyaizu, M. (1986). Studies on products of browning reaction: antioxidative activity of products of browning reaction. Japanese Journal of Nutrition, 40, 307–315.
12. Bhuiyan MAR, Hoque MZ and Hossain SJ Free Radical Scavenging Activities of *Zizyphus mauritiana*, World Journal of Agriculture Science: 2009, 5(3), 318-322.
13. Ozturk, M., Ozturk, F.A., Duru, M.E. and Topcu, G. 2007. Antioxidant activity of stem and root extracts of Rhubarb (*Rheum ribes*): An edible medicinal plant. Food Chemistry 103: 623-630.
14. Stoilova, I., Krastanov, A., Stoyanova, A., Denev, P. and Gargova, S. 2007. Antioxidant activity of a ginger extract (*Zingiber officinale*). Food Chemistry 102: 764-770.

15. Akowuah, G.A., Ismail, Z., Norhayati, I. and Sadikun, A. 2005. The effects of different extraction solvents of varying polarities of polyphenols of *Orthosiphon stamineus* and evaluation of the free radical-scavenging activity. Food Chemistry 93: 311-317.
16. Suhaj, M. 2006. Spice antioxidants isolation and their antiradical activity: a review. Journal of Food Composition and Analysis 19: 531-537.
17. Alothman, M., Bhat, R. and Karim, A.A. 2009. Antioxidant capacity and phenolic content of selected tropical fruits from Malaysia, extracted with different solvents. Food Chemistry 115: 785-788.
18. Wong, C., Li, H., Cheng, K. and Chen, F. 2006. A systematic survey of antioxidant activity of 30 Chinese medicinal plants using the ferric reducing antioxidant power assay. Food Chemistry 97: 705-711.