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# EVALUATION OF ANTIOXIDANT POTENTIAL OF DIFFERENT EXTRACTS OF MANGO GINGER (*CURCUMA AMADA* ROXB.) RHIZOME

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**ABSTRACT:** The Zingiberaceae has the great importance in the plant kingdom because the members of this family give up spices, perfumes, dyes and valuable medicines. Alongside, a number of species of this family are cultivated for flowering. Mango ginger is one of the important species of this family having medicinal and biological properties such as antiageing, antibacterial, antioxidant, anti-inflammatory, antiallergic, antifungal, platelet aggregation inhibition activity and analgesic activity. In Ayurveda and Unani medicines of system, its rhizomes are useful as expectorant, appetizer, alexteric and laxtative. The rhizomes of mango ginger are also used in skin diseases, bronchitis, asthama and inflammatiom. Present examination aims to evaluate and compare antioxidant potential of different extracts of mango ginger using 1,1-diphenyl-2-picrylhydrazyl assay. In this study, methanol and ethyl acetate extracts of mango ginger rhizomes was estimated as good antioxidant activity which is may be due to phenolics, curcuminoids, essential oil, terpinoids and flavonids present in good amounts in these extracts, whereas dichloromethane and aqueous extracts has very little capability of radical scavenging activity.

**INTRODUCTION:** Plant kingdom has the good and very important sources of natural and valuable bioactive compounds which can be used for different health benefits by the human. The phytochemicals present in the different plants can defend from several kinds of diseases[1]. Several scientific investigation suggests that superoxide radicals, hydroxyl radicals, nitric oxide radicals and many more free radicals induces oxidative damage to DNA, lipid, proteins and causes numerous disorders[2, 3].

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These free radicals can cause carcinogenesis, neuro degenerative, cardiovascular diseases [4, 5] ageing, atherosclarosis, inflammation, diabetes mellitus, and associated with several other diseases[3, 6, 7]. The oxidative stress is inhibited by the antioxidant molecules by reducing these free radicals and detoxifies the organisms [8].

The plants rich in antioxidants can play a beneficial role in the prevention and treatment of several diseases. Hence, plant derived antioxidants and their bioconjugates are now getting an important position in free radical biology [9-11]. Very large numbers of phenolics present in spices, vegetables, fruits, foods and herbs have been identified as good source of antioxidant. Due to carcinogenicity of the synthetic antioxidants, the interest has been increased in research related to alternative

antioxidant molecules' including plant extracts which is comparatively less harmful [12].

Mango ginger (*Curcuma amada* Roxb.) is an important spice of the family Zingibaraceae. It is also known as amra haridra, amahaldi, taldiha, sarabanghati and banhaldi in different region of Bharat. Mango ginger is a perennial herb which is morphologically similar to the ginger (*Zingiber officinale*) but with the mango (*Magnifera indica*) flavor. Rhizomes of mango ginger mainly used for pickles making because of its mango test. The major constituents found in its rhizomes are curcuminoids[13] (curcumin, demethoxycurcumin, bis-demethoxycurcumin), penolic[14] compounds (caffeic acid, gentisic acid, ferulic acid, gallic acid, cinnamic acid), terpinoids[15] (difurocumenol, amadannulen, amadaldehyde) and essential oil[16] (β-myrcene and α-asarone). The mango ginger has the numerous biological[15] activities such as antioxidant, antibacterial, anti-inflammatory, antiallergic, antifungal, platelet aggregation inhibition activity and analgesic activity.

In Ayurveda and Unani medicine, rhizome of mango ginger is used as expectorant, appetizer, alexteric and laxtative[17, 18], also used in skin diseases, bronchitis, asthama and inflammation[18, 19].

The present study was carried out to evaluate and compare the antioxidant properties of different solvent extracts of mango ginger rhizomes.

## MATERIALS AND METHODS:

The rhizomes of mango ginger were collected from local market and identified by botany department of CMP Degree College, Allahabad. Chemicals such as 1,1-diphenyl-2-picrylhydrazyl (DPPH$^*$) was purchased from HiMedia Pvt. Ltd. Mumbai, India and gallic acid from CDH Pvt. Ltd. New Delhi, India. Solvents such as methanol AR, ethyl acetate AR and diclorometh ane AR were purchased from Loba Chemie Pvt. Ltd. Mumbai, India. Vacuum rotary evaporator (Perfit, Model No. VP50D) was used to dry extracts and UV-Visible spectrophotometer (Systronic, Model No. 1302) was used for recording the absorbance of all samples. The research has carried out in the Department of Chemistry, CMP Degree College, Allahabad during June 2014 to November 2014.

### Preparation of extracts of mango ginger:

The mango ginger rhizome (10 g) were cut into small pieces and refluxed with 50 ml dichloromethane, ethyl acetate, methanol and double distilled water separately on heating mantle for 20 minutes. The extracts were filtered. After filtration, solvents were evaporated and dried by vacuum rotary evaporator under pressure to make extracts in powder form. Now the antioxidant potential of different solvent extracts of mango ginger rhizome were examine to evaluate antioxidant potential by free radical scavenging assay.

### DPPH$^*$ radical scavenging assay:

The antioxidant potential of the extracts of mango ginger rhizome were estimated by the spectrophothmetric assay as described previously[20, 21] using the stable free radical DPPH$^*$. In brief, the stock solutions of the extracts were prepared (1mg/10 ml) in methanol. Pipette out 1.0, 0.5, 0.25, 0.125 and 0.062 ml of the extract in separate test tubes and samples were made up to 2 ml with methanol. Now 2 ml of DPPH$^*$ solution (0.002%) was added in each test tube. Gallic acid was used as standard antioxidant and methanol with DPPH$^*$ was used as control. After vigorous shaking all the test tubes of samples, standard and control were kept in dark for 30 minutes.

Now, absorbance of all the solution was measured by UV-VIS spectrophotometer at 517 nm. All the samples were analyzed in triplicate. The radical scavenging activities of the samples were determined by removal of the purple colored methanol solution of DPPH$^*$. Lower absorbance of the reaction mixture indicates the greater free radical scavenging capability of the extract. The capacity of scavenging the DPPH$^*$ radical was calculated by using the following formula.

% Inhibition of DPPH$^*$ activity = (Ac - As / Ac) X 100

Where Ac = absorbance of control;
As = absorbance of sample.

**RESULTS:** Different extracts of mango ginger rhizome were obtained by reflux with various solvent i.e. dichloromethane, ethyl acetate,

methanol and water (**Table 1**) to evaluate their antioxidant activity. DPPH* assay is the reliable and rapid method to test antioxidant potential of the any molecules/compounds by radical scavenging activity. With this method, it is possible to evaluate the radical scavenging activity by measuring the absorbance of the reaction mixture of different extracts (**Fig.1**). According to graph plotted between the absorbance and concentration of the extract, it is estimated that lower the absorbance showed greater antioxidant activity. Among all the extracts examined, methanol extract was estimated good antioxidant potential with 66.08% radical scavenging activity which is followed by ethyl acetate extracts with 52.65%. However, dichloromethane and aqueous extracts were exhibited very lees antioxidant potential with 39.22 and 36.75% in comparison to standard (Gallic acid) and other extracts (**Fig.2**).

**TABLE 1: ANTIOXIDANT POTENTIAL OF DIFFERENT EXTRACTS OF MANGO GINGER RHIZOME.**

| Sl. No. | Mango ginger extracts | % Antioxidant potential |
|---|---|---|
| 1 | Dichloromethane | 39.22 |
| 2 | Ethyl acetate | 52.65 |
| 3 | Methanol | 66.08 |
| 4 | Aqueous | 36.75 |
| 5 | Gallic acid (Stand.) | 95.75 |

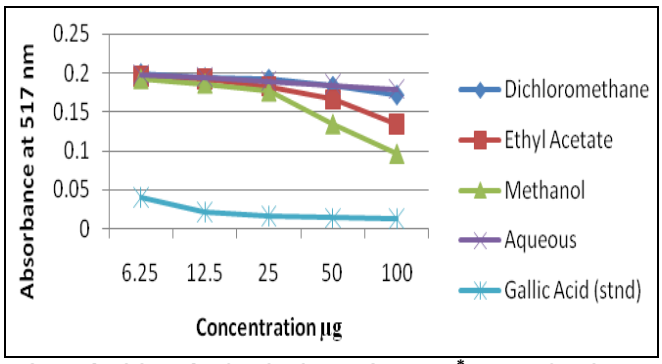


**FIG. 1: ABSORBANCE SHOWING DPPH* REDUCTION BY DIFFERENT EXTRACTS OF MANGO GINGER RHIZOME.**

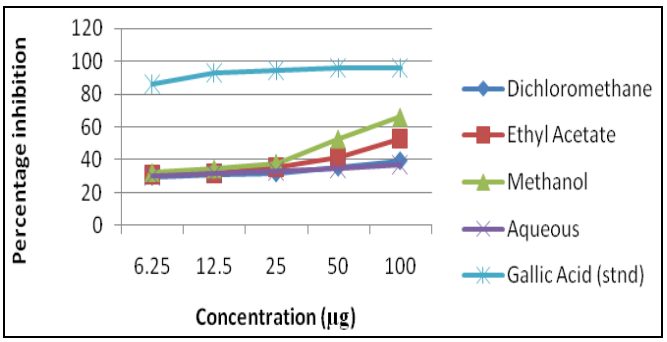


**FIG.2: ANTIOXIDANT ACTIVITIES OF DIFFERENT EXTRACTS OF MANGO GINGER RHIZOME.**

**DISCUSSION:** There are a number of limitations in different methods to determine the antioxidant potential [22]. Numerous methods are likely to be used for evaluating antioxidant activity which involves the generation of free radical species, where the existence of antioxidants molecules determine the disappearence of free radicals [23]. In this study, a stable free radical DPPH* is used to measured the scavanging activity of antioxidants because it is very susceptible to detect the active ingredient at small concentration [24]. As previous study[12, 25, 26] showed that antioxidant activity of plants are depend upon the existence of phenolics, curcuminods, essential oil, terpinoids and flavonids, hence the higher antioxidant capacity of methanol and ethyl acetate extracts of mango ginger can be atributed to good amounts of caffeic acid, gentisic acid, ferulic acid, gallic acid, cinnamic acid, curcumin, demethoxicurcumin, bes-demethoxicurcumin, β-myrcene, α-asarone, difurocumenol and amadannulen. The phenolics and other bioactive compounds present in dichloromethane and aqueous extracts of mango ginger may be in a smaller amount, but they have still ability of radical scavenging activity.

**CONCLUSION:** Now adays, available drugs used in the treatment of numerous diseases can arises many complications. Phytochemicals rich plants are used for therapeutic preparation in Ayurveda and Unani medicines of system from long time. Mango ginger is a very important spice which has several biological and medicinal properties. Therefore, different extracts of mango ginger rhizome were estimated for radical scavenging acivity and found that methanol and ethyl acetate extracts showed good antioxidant activity. However, dicloromethane and aqueous extrcts were exhibited as very less antioxidant potential. Further, mango ginger extracts and synthesis of their active contituent can lead to expansion of pharmaceutical products.

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## REFERENCES:


1. Fang F, Sang S, Chen KY, Gosslan A, Ho CT and Rosen RT: Isolation and identification of cytotoxic compounds from bay leaf (*Laurus nobilis*). Food Chem 2005; 93: 497–501.
2. Zhu QY, Hackman RM, Ensunsa JL, Holt RR, and Keen CL: Antioxidant activities of oolong tea. Journal of Agricultural and Food Chemistry 2002; 6929-6934.
3. Halliwell B: Free radicals, antioxidants and human disease: Curiosity, cause, or consequence? Lancet 1994; 344: 721–724.
4. Hou WC, Lin RD, Cheng KT, Hung YT, Cho CH and Chen CI: Free radical scavenging activity of Taiwanese native plants. Phytomedicine 2003; 10: 170-175.
5. Kahkonen MP, Hopia AI, Vuorela HJ, Rauha J, Pihlaja K and Kujala ST: Antioxidant activity of plant extracts containing phenolic compounds. Journal Agric Food Chem 1999; 47: 3954-3962.
6. Maxwell SRY: Anti-oxidant therapy: Does it have a role in the treatment of human disease? Expert Opin. Inv. Drugs 1997; 6: 211–236.
7. Pincemail J: Free Radicals and Antioxidants in Human Diseases. In: Analysis of Free Radicals in Biological Systems. Birkhauser Verlag, Basel, Switzerland 1995: 83–98.
8. Saeidnia S and Abdollahi M: Who Plays Dual Role in cancerous and Normal Cells? Natural Antioxidants or Free Radicals or the Cell Enviroment. Int J Pharmacol 2012; 8: 711-712.
9. Pandey A, Gupta RK and Srivastava R: Curcumin: The Yellow Magic. Asian Journal of Applied Sciences 2011; 4(4): 343-354.
10. Pandey A, Pandey KB, Gupta RK and Rizvi SI: Ferric reducing antiradical and β- carotene bleaching activities of nicotinic acid and picolinic acid bioconjugates of curcumin. Natural Product Communication 2011; 6(12): 1877-1880.
11. Gupta RK, Shukla AK, Gaur H and Pandey A: Antioxidant activity of some nutraceuticals. In: Innovative and modern technologies for sustainable agriculture and rural development 2014. 307-312. ISBN: 978-81-923494-3-5.
12. Sasaki YF, Kawaguchi S, Kamaya A, Oshishita M, Kabasawa K and Iwama K: The comet assay with 8 mouse organs: results with 39 currently used food additives. Mutat Res 2002; 519: 103-119.
13. Gupta AP, Gupta AM, and Sushil KK: Simultaneous determination of curcuminoids in curcuma samples using high performance thin layer chromatography. J. Liq. Chromatog. Technol 1999; 22: 1561-1569.
14. Siddaraju MN and Dharmesh SM: Inhibition of gastric $H^+$, $K^+$ - ATPase and *Helicobactor pylori* growth by phenolic antioxidants of curcuma amada. J. Agrc. Food Chem. 2007; 55: 7377-7386.
15. Policegoudra RS, Aradhya SM and Singh L: Mango ginger (Curcuma amada Roxb.) – A promising spice for phytochemicals and biological activities. J. Biosci. 2011; 36(4): 739-748.
16. Vishnupriya M, Nishaa S, Sasikumar JM, Teepika Priya Darsini D, Hephzibah Christabel P and Gopalkrishnan VK: Chemical composition and antioxidant activity of essential oil from *Curcuma amada* Roxb. International Research Journal of Pharmacy 2012; 3(6): 99-103.
17. The Wealth of India: Raw materials. CSIR, New Delhi, India. 1950.
18. Kirtikar KR and Basu BD: Indian Medicinal Plants, Dehra Dun, India. 1984.
19. Warrier PK, Nambiar VPK and Ramankutty C: Indian Medicinal Plants – A Compendium of 500 Species. Orient Longman Pvt. Chennai, India. 1994.
20. Khalaf NA, Shakya AK, Othman AA, EL-Agbar Z and Farah H: Antioxidant activity of some common plants. Turk J Biol 2008; 32: 51-55.
21. Sardha M, Ranjitham P and Paulsamy S: Evaluation of in vitro antioxidant properties of callus culture of an endangered medicinal tree species *Hildegardia populifolia* (ROXB) Schott and endl. International Journal of Pharmaceutical Sciences and Research 2014; 5(3): 839-848.
22. Kaur C and Kapoor HC: Review: Antioxidants in fruits-the millennium's health. International Journal of food Science and Technology 2001; 36: 703-725.
23. Cao G, Alessio HM and Cutler RG: Oxygen-radical absorbance capacity assay for antioxidants. Free radical Biology and Medicine 1993; 14: 303-311.
24. Oyaizu M: Studies on products of browning reactions: antioxidant activities of products of browning reaction prepared from glucose amine. Japanese Journal of Nutrition 1986; 44: 307-315.
25. Gupta RK, Chawla P, Tripathi M, Shukla AK and Pandey A: Synergistic antioxidant activity of tea with ginger, black pepper and tulsi. International Journal of Pharmacy and Pharmaceutical Sciences 2014; 6(5): 477-479.
26. Policegoudra RS, Chandrashekhar RH, Aradhya MS and Singh L: Cytotoxicity, platelet aggregation inhibitory and antioxidant activity of *Curcuma amada* Roxb. Extracts. Food Technol. Biotechnol. 2011; 49(2): 162-168.


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