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Phytochemical composition and antioxidant property of methanolic leaf extract of *Lantana camara* Linn.

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Abstract

Oxidative stress has been shown to play an important role in the development of a number of pathological events in human body. Natural antioxidants would be effective in protecting the human body from the oxidative damage by free radicals. Plants are a source of large amount of drugs belonging to different groups that are known to relieve various diseases including oxidative stress. *Lantana camara* Linn., is a noxious weed belonging to Verbenaceae. Extracts from the leaves of this plant have been reported to have various biological activities. In the present study, methanolic leaf extract of *L. camara* was subjected to preliminary phytochemical screening and antioxidant activities analysis. The antioxidant activities were measured *in vitro* using various antioxidant assays including 1,1-diphenyl-2-picryl-hydrazyl (DPPH), superoxide anion radicals (O_2^-) and hydroxyl radical (OH^-) scavenging activity, nitric oxide free radical scavenging activity, reducing power assay and metal chelating activity, compared with the positive controls butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), ascorbic acid and ethylenediaminetetraacetic acid (EDTA). The methanolic leaf extract of *L. camara* exhibited effective antioxidant property *in vitro*. High free radical scavenging activity as well as strong reducing power and ion chelating abilities were observed. Thus the results obtained in the present study indicate that the methanolic leaf extract of *L. camara* can be a potential source for natural antioxidant.

Key words : *Lantana camara* Linn., methanolic leaf extract, phytochemical screening, antioxidant properties.

Reactive oxygen species (ROS) that includes free radicals such as superoxide anion radicals (O_2), hydroxyl radicals (OH^-) and non-free radical species such as H_2O_2 and singlet oxygen (O_2) has attracted increasing attention over the past decade. Under pathological

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conditions, ROS is overproduced and results in oxidative stress. Many diseases are caused by oxidative stress such as cardiovascular disease, tumor growth, wrinkled skin, cancer, Alzheimer's disease, etc.[2]. Antioxidants play an important role to protect the human body against damage by reactive oxygen species. Deleterious effects of ROS are minimized by antioxidants. The antioxidants can interfere with the oxidation process by reacting with free radicals[4]. Synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) are available; however, these are reported to be carcinogenic[7]. In recent years, there has been an increasing interest in finding natural antioxidants, which can protect the human body from free radicals and retard the progress of many chronic diseases[10]. Efforts have been made to search for novel natural antioxidants from plants. The natural plant parts contain a large variety of phytochemicals having antioxidant potential that could eradicate the oxidative stress caused by reactive oxygen species[6].

Lantana camara Linn. (*Verbenaceae*) is a plant which is commonly known as wild sage - a notorious weed and is a popular garden plant. It is an annual plant, 1 - 3 m high and has various uses in folklore medicine in many parts of the world. Although a native of tropical America, has been completely naturalized in many parts of India. Extracts from the leaves of this plant have been reported to have various biological activities such as antimicrobial, fungicidal, insecticidal and nematicidal activity[3,11]. The present study was carried out to evaluate the leaves of *L. camara* Linn., for antioxidant activities *in vitro*.

Collection of the plant material and preparation of extracts :

Leaves of *Lantana camara* Linn. were collected from local fields and were shade dried at room temperature for 2-3 days. These dried leaves were then powdered in a mixer so as to get a coarse powder for extraction. *L. camara* leaves were extracted in a soxhlet extractor. 100 g of the powdered material was extracted with 500 ml of methanol for 24 hrs. After extraction the solvent was evaporated in rotary flash evaporator. The residue from extract was dried in the desiccator and the resultant extract was stored in an air tight container at 4°C for further use[1,3]. The extract was subjected to preliminary phytochemical testing and *in vitro* antioxidant activities.

Phytochemical screening of methanolic leaf extract :

The methanolic leaf extract of *L. camara* was subjected to phytochemical tests following standard procedures[1,5] to detect phytoconstituents like proteins, reducing sugars, oils and fats, cardiac glycosides, tannins, saponins, phenols, flavonoids, phytosterols, alkaloids, steroids, catachin, anthroquinone, and terpenoids.

Screening for antioxidant activities :

The antioxidant activities of methanolic leaf extract of *L. camara* were measured *in vitro* using various antioxidant assays including 1,1-diphenyl-2-picryl-hydrazyl (DPPH), superoxide anion radicals (O_2^-) and hydroxyl radical (OH^-) scavenging activity, nitric oxide free radical scavenging activity, reducing power assay and metal chelating activity, compared with the positive controls ascorbic

acid, butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA)[9].

Phytochemical screening of methanolic leaf extract of *L. camara* revealed the presence of reducing sugar, proteins, phenols, alkaloids, flavonoids, saponins, tannins, and cardiac glycosides (Table-1). The strong free radical scavenging effect of the methanolic leaf extract of *L. camara* was confirmed by the results of the present study in DPPH assay, superoxide anion radicals (O_2^-) and hydroxyl radical (OH^-) scavenging assay, nitric oxide free radical scavenging assay. The reducing power and metal chelating activity of the extract were also significant. The methanolic extract showed stronger effect that was comparable to standard antioxidants (ascorbic acid, EDTA, BHT and BHA) (Figure 1 - 6). The results indicated that the methanolic leaf extract of *L. camara* has good antioxidant activity.

Table-1. Phytochemicals of *Lantara camara* methanolic leaf extract

Sl. No.	Phytochemicals	
1	Reducing Sugar	+
2	Protein	+
3	Phenol	+
4	Alkaloids	+
5	Flavonoids	+
6	Saponins	+
7	Tanins	+
8	Cardiac glycosides	+
9	Steroids	-
10	Terpenoids	-
11	Anthroquinone	-
12	Oils and fats	-

+ Present; - Absent

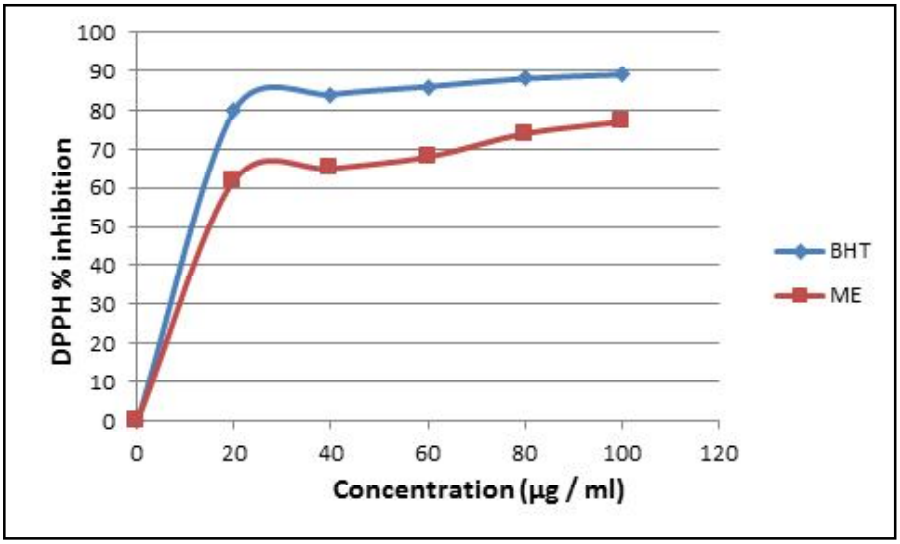

Fig. 1. DPPH radical scavenging activity of butylated hydroxytoluene (BHT) and methanolic leaf extract (ME) of *Lantana camara*

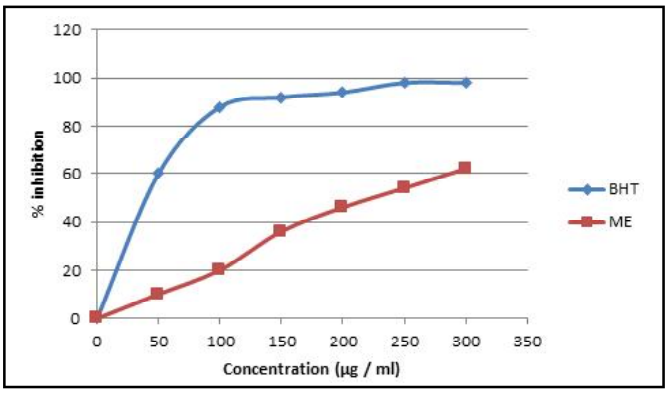

Fig. 2. Superoxide anion (O_2^-) radical scavenging activity of butylatedhydroxy-toluene (BHT) and methanolic leaf extract (ME) of *Lantana camara*

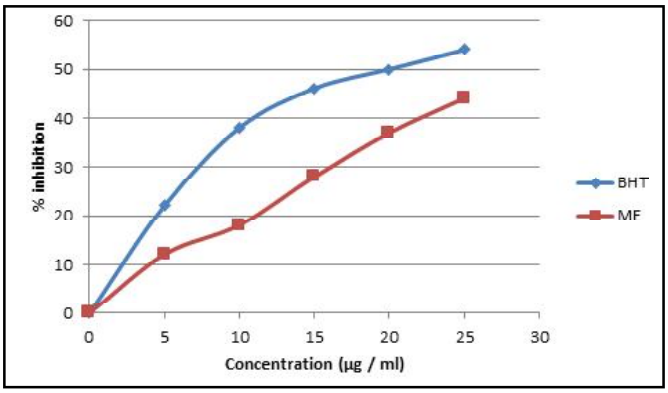

Fig. 3. Hydroxyl (OH) radical scavenging activity of butylated hydroxytoluene (BHT) and methanolic leaf extract (ME) of *Lantana camara*

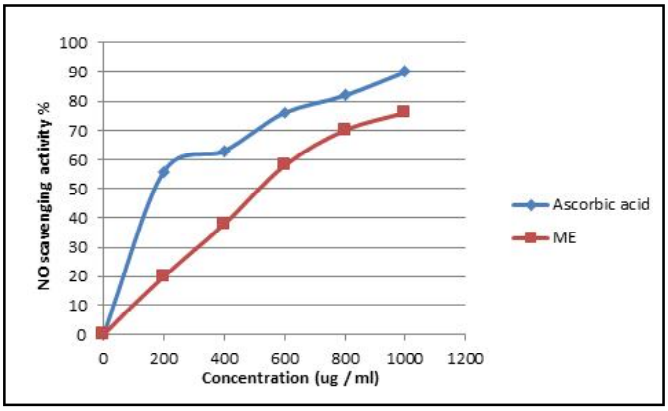

Fig. 4. Nitric oxide (NO) radical scavenging activity of ascorbic acid and methanolic leaf extract (ME) of *Lantana camara*

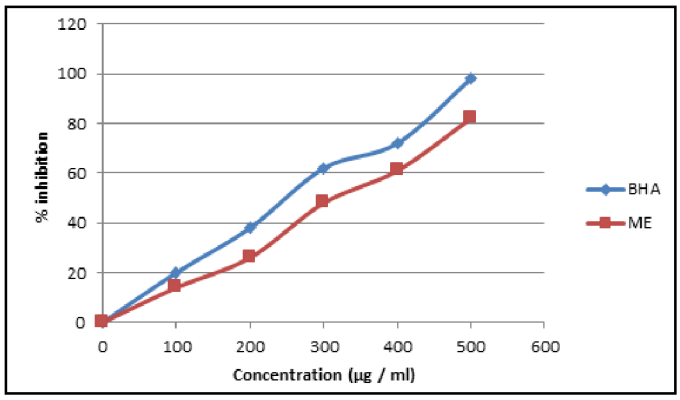

Fig. 5. Reducing power assays of butylated hydroxyanisole (BHA) and methanolic leaf extract (ME) of *Lantana camara*

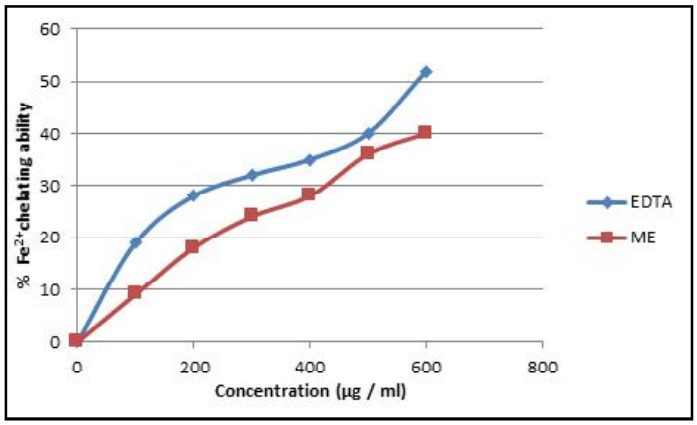

Fig. 6. Fe^{2+} metal chelating ability of Ethylenediaminetetraacetic acid (EDTA) and methanolic leaf extract (ME) of *Lantana camara*

Free radicals play an important role in the pathogenesis of several human diseases, such as cancer, rheumatoid arthritis, and cardiovascular diseases. Plants having a wide variety of phytochemicals serve as a main source for natural antioxidants that could decrease the pathogenesis of free radicals[6]. The results of this study clearly indicated that the methanolic leaf extract of *L. camara* has potential antioxidant activity. The phytochemical screening of the methanolic leaf extract of *L. camara* revealed the presence of phenolic compounds, particularly flavonoids and tannins, which have significant antioxidant effects[8]. This may be the reason for good antioxidant property observed with methanolic leaf extract of *L. camara*. Owing to the fact that synthetic antioxidants like butylated hydroxyl anisole (BHA), butylated hydroxyl toluene (BHT) etc. have side effects such as carcinogenicity, presently interest has increased considerably for natural antioxidants[7], and *L. camara* could

be a good source for natural antioxidants. However, further studies are needed to evaluate the *in-vivo* antioxidant potential of this plant in various animal models as well to know the exact molecule/molecules contributing to the activity.

In conclusion, methanolic leaf extract of *L. camara* was proved to be very effective in the comprehensive evaluation of antioxidant activity *in vitro*. It may exert antioxidant action *in vitro* by both chelating metal ions and scavenging free radicals. It may therefore be used as natural antioxidant.

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