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COMPARATIVE ANTIOXIDANT ACTIVITY OF AQUEOUS EXTRACT OF *CAMELLIA SINENSIS* AND *TINOSPORA CORDIFOLIA*

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Abstract

Free radicals or highly reactive oxygen class are able of inducing oxidative injuries to human body. Antioxidants are the compounds which terminate the attack of reactive species and reduce the risk of diseases. The present study was conducted to determine the antioxidant properties of two medicinal plants *Camellia sinensis* and *Tinospora Cordifolia* using two methods DPPH and Reducing power assay. The extract of *Camellia sinensis* aqueous extract exhibited good antioxidant activity as compared to aqueous extract of *Tinospora cordifolia* in both the methods. These differences might be due to their different antioxidant mechanisms or variations in their ability to scavenge free radicals.

Keywords: *Camellia sinensis, Tinospora Cordifolia,* Antioxidant, DPPH, Reducing power assay

INTRODUCTION:

As antioxidant is a molecule capable of slowing or preventing the oxidation of other molecules. Oxidation is a chemical reaction that transfers electron from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, which start chain reactions that damage cells. Many herbs contain antioxidant compounds which protects the cells against the damaging effects of reactive oxygen species. Phenolic compounds from medicinal plants possess strong antioxidant activity and may help to protect the cells against the oxidative damage caused by free-radicals. Antioxidants from plant materials terminate the action of free radicals thereby protecting the body from various diseases. [1]

Camellia sinensis is commonly known as green tea in the India. *C. sinensis* is mainly cultivated in India (Assam) and China. Green tea has many beneficial effects on the body. So we analyze the various pharmacological effect of green tea.

Tea (*Camellia sinensis* L.; family Theaceae), the most popular and widely cultivated beverage in Southeast Asia, has received considerable attention among scientists due to its beneficial health effects. The health benefits associated with tea consumption have been attributed in part to the antioxidant activity and free radical-scavenging ability of the most abundant tea catechins.[2]

Tinospora cordifolia (Thunb.) Miers, (Guduchi) is one of the important dioecious plants. In Hindi, the plant is commonly known as Giloe.[3] It is indigenous to areas of India, Myanmar, Sri Lanka, China, Thailand, Philippines, Indonesia, Malaysia, Borneo, Vietnam, Bangladesh, North Africa, West Africa, and South Africa7-10. The plant mainly contains alkaloids, glycosides, steroids, sesquiterpenoid, aliphatic compound, essential oils, mixture of fatty acids and polysaccharides. The alkaloids include berberine, bitter gilonin, non-glycoside giloningilosterol. [4]

MATERIALS AND METHODS

Collection of the Sample

The fresh leaves of *Camellia sinensis* and Whole plant material *Tinospora cordifolia* were purchased from Sanjivani Ayurved, Bhopal.

Chemicals

All chemicals used were of analytical grade and were supplied by the department.

Instruments

The instruments facility of Institute was utilized.

Preparation of plant extracts

The prepared whole plant materials of guduchi and leaf part of green tea (30 g) were extracted three times for 30 min with distilled hot water in separating funnel. The temperature was maintained at 37°C. Ratio of plant material and solvent was 1:10. The extracts were filtered through a paper filter (Whatman, No.1) and evaporated to dryness under reduced pressure by the rotary evaporator. The obtained crude extracts were stored in dark glass bottles for further processing.

Preliminary phytochemical screening

Phytochemical screening of the aqueous extract of the plant material were performed to investigate the presence or absence of the different phytochemical constituents such as were subjected to different tests for the active constituents viz. phenols, flavonoids, saponins, tannins, steroids, terpenoids, coumarins, cardiac glycosides and chemical tests were carried out on the aqueous extract using standard procedures.[5-6]

In-Vitro Free radical scavenging activity (2, 2-Diphenyl-1-Picrylhydrazyl - DPPH): [7]

It is a **s**table free radical by virtue of the delocalization of the spare electron over the molecule as a whole, so that the molecules do not dimerise. When a solution of DPPH is mixed with that of a substance that can donate a hydrogen atom, then this gives rise to the reduced form with the loss of this violet color.

Procedure:

DPPH scavenging activity was measured by the spectrophotometer. Stock solution (1.5 mg/ml in methanol) was prepared such that 75 µl of it in 3 ml of methanol gave an initial absorbance. Decrease in the absorbance in presence of sample extract at different concentration (10- 100 µg/ml) was noted after 15 minutes. 75 µl of DPPH solution was taken and volume made till 3 ml with methanol, absorbance was taken immediately at 517 nm for control reading. 75 µl of DPPH and 50 µl of the test sample of different concentration were put in a series of volumetric flasks and final volume was adjusted to 3 ml with methanol. Three test samples were taken and each processed similarly. Finally, the mean was taken. Absorbance at zero time was taken for each concentration. Final decrease in absorbance was noted of DPPH with the sample at different concentration after 15 minutes at 517 nm.

Reducing power assay

The ability of extracts to reduce ferric ions (Fe^{+3}) was assessed by the method of (Oyaizu, 1986). 800 µl of extract was mixed with 400 µl phosphate buffer (0.2 M, pH=6.6) and 800 µl of a 1% potassium ferricyanide [$K_3Fe(CN)_6$], then the mixture was incubated at 50 °C for 20 min. About 800 µl (10%) of trichloroacetic acid (TCA) was added to the mixture and centrifuged for 10 min (3000 r/t). Finally, 400 µl of the supernatant solution was mixed with 400 µl of distilled water and 80 µl $FeCl_3$ (0.1%) and the absorbance was recorded at 700 nm. Increased absorbance of the reaction mixture indicated increased reducing power. The results were expressed as µg ascorbic acid equivalent/mg extract. [8]

$$\textbf{Calculation of \% Reduction} = \frac{\text{Control Absorbance - Test absorbance}}{\text{Control Absorbance}} \times 100$$

Results and Discussion

Phytochemicals are the core of phytomedicines; their therapeutic efficiency directly correlates with the presence of various phytochemicals. Both the selected plant showed the presence of phenols, flavanoids, saponins and carbohydrate.

Results of antioxidant activity

There is increasing evidence that indigenous antioxidants may be useful in preventing the deleterious consequences of oxidative stress and there is increasing interest in the protective biochemical functions of natural antioxidants contained in herbs and medicinal plants. Antioxidant activity of aqueous extracts is measured by free radical scavenging activity and reducing power assay. The tested plant extracts showed strong antioxidant activity Table 1.

Table 1. Results of antioxidant activity using DPPH method

% inhibition of aqueous extract and ascorbic acid using DPPH method

S. No.	Concentration	% Inhibition		
		Ascorbic acid	*Camellia sinensis*	*Tinospora cordifolia*
1	20	44.53988	43.80368	33.49693
2	40	56.93252	56.07362	37.42331
3	60	69.20245	61.34969	40.8589
4	80	84.66258	64.53988	56.56442
5	100	87.97546	76.07362	61.71779
IC 50		52.980	98.5263	109.296

Table 2. Results of antioxidant activity using reducing power assay

% inhibition of aqueous extract and ascorbic acid using reducing power assay

S. No.	Concentration	% Inhibition		
		Ascorbic acid	*Camellia sinensis*	*Tinospora cordifolia*
1	20	44.66258	7.484663	19.2638
2	40	48.34356	12.63804	31.53374
3	60	56.80982	18.40491	36.80982
4	80	73.61963	33.49693	40.4908
5	100	86.25767	37.17791	45.64417
IC 50		62.86092	122.4553	146.1077

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Conclusion

The scientific reports and experimental studies have shown that plants contain a large variety of phytochemicals that have antioxidant property. Natural antioxidants or phytochemical antioxidants are the secondary metabolites of plants. Our data indicate that the *Camellia sinensis* and *Tinospora cordifolia* extracts are potential sources of secondary metabolites and their aqueous extracts possess good antioxidant activity. An effort has been made to explore the antioxidant properties of commercial available herbal extracts. This indicates the potential of the extracts as a source of natural antioxidants or nutraceuticals with potential application to reduce oxidative stress with consequent health benefits.

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