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PHYTOCHEMICAL ANALYSIS AND ANTIOXIDANT POTENTIAL OF GREEN TEA AND GUDUCHI AQUEOUS EXTRACT

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Abstract

The objective of the present study was to evaluate the phytochemical constituent and antioxidant activity of Green tea and Guduchi aqueous extract. Phytochemical screening was performed by the well-known tests protocol available in the literature using standard. The antioxidant properties of aqueous extract of selected plants were evaluated, through determination of H2O2 radical scavenging assay. The phytochemical screening revealed the presence of various phytoconstituents and showed greater H_2O_2 radical scavenging assay activity (IC_{50} = 155.003 and 169.7683). Consequently, the plants would be considered as promising sources of antioxidant phytochemicals.

Keywords: Traditional Medicines, Physicochemical Analysis, Phytochemical Screening, Green tea, Guduchi.

INTRODUCTION

Nature has provided many things for humankind over the years, including the tools of the first attempts at therapeutic intervention. Ancient civilization depended on plant extracts for the treatment of various ailments. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannin, flavonoids and phenolic compounds. [1,2] Many plant extracts have been reported to have multiple biological effects, including antioxidant properties due to their phytoconstituents including phenolics. Within the antioxidant compounds, flavonoids and phenolics with a large distribution in nature have been studied.[3] Phytochemical components, especially polyphenols are known to reduce oxidative stress. Phenolic compounds are secondary metabolites are known to be responsible for the antioxidant activity of plants. These compounds are suggested to contribute to the health-promoting properties.

Green tea became a very popular beverage in the western countries and almost everyday new functional beverages with green tea extract as an ingredient are developed. Green tea is derived from *Camellia sinensis*, an evergreen plant of the Theaceae family. Cultivation of tea plants is economically important in many countries, and the tea plant, Camellia sinensis is known to be grown in as many as 30 countries. *Camellia sinensis* grows best in certain tropical and subtropical regions.[4,5]

T. Cordifolia is commonly known as Guduchi in India. *Tinospora cordifolia* belonging to the family Menispermaceae, is a large, deciduous, climbing shrub found throughout India, especially in the tropical parts ascending to an altitude of 300 m. and also in certain parts of China.[6,7] *Tinospora cordifolia* has a wide array of bioactive principles as well as it has been proven medicinally important plant, have not received considerable scientific attention.

Considering the important of all above plants, present study deals to determine phytochemical analysis and antioxidant potential of Green tea and Guduchi aqueous extract. The physico-chemical parameters like total ash, water soluble ash, water insoluble ash, acid soluble ash & loss on drying also were calculated.

MATERIALS AND METHODS

Collection of plant material

The plant materials were collected from Sanjivani Herbal Bhopal. The plant samples were rinsed with tap water and then with deionized water. It was dried, chopped, crushed and powdered with electrical grinder and then the dried powder samples were stored in polyethene bottles for further processes.

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 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.[8-10]

Physico-chemical analysis

Physicochemical analysis includes total ash, water insoluble ash, water soluble ash, acid insoluble ash and loss on drying as per standard methods.[11-13]

Hydrogen peroxide scavenging assay

Hydrogen peroxide is a weak oxidizing agent and can inactivate a few enzymes directly, usually by oxidation of essential thiol (-SH) groups. Hydrogen peroxide can cross cell membranes rapidly, once inside the cell, H_2O_2 can probably react with Fe^{2+}, and possibly Cu^{2+} ions to form hydroxyl radical and this may be the origin of many of its toxic effects. It is therefore biologically advantageous for cells to control the amount of hydrogen peroxide that is allowed to accumulate.[14]

Method

Scavenging activity of Hydrogen peroxide (H_2O_2) by the plant extract was determined by the method of Ruch [15]. Plant extract (4 ml) prepared in distilled water at various concentration was mixed with 0.6 ml of 4 mM H_2O_2 solution prepared in phosphate buffer (0.1 M pH 7.4) and incubated for 10 min. The absorbance of the solution was taken at 230 nm. Ascorbic acid was used as a positive control compound. The percentage of inhibition was calculated by comparing the absorbance values of the control and test samples using following equation. $S\% = [(A_{control} - A_{sample})/A_{control}]\times100$ where $A_{control}$ = absorbance of the blank control (containing all reagents except the extract solution) and A_{sample} = absorbance of the test sample.

Results and discussion

The results of physico-chemical analysis of plant materials are shown in Table 1. The total amount of ash and extractive values was highest for Green tea where as lowest for Guduchi. The phytochemical quantitative compositions of different medicinal plants are shown in Table 2.

Table 1: Physico-chemical analysis of Green tea and Guduchi

S. No.	Parameters	Green tea (Value in w/w)	Guduchi (Value in w/w)
1.	Total ash	8.6%	8.1%
2.	Water soluble ash	2.63%	2.80%
3.	Acid insoluble ash	1.56%	1.76%
4.	Loss on drying	2.2%	1.3%
5.	Extractive value	1.5%	1.5%
6.	pH in 1% solution	4.4	4
7.	pH in 10% solution	4.1	3.7

Phytochemicals are the core of phytomedicines; their therapeutic efficiency directly correlates with the presence of various phytochemicals.

Table 2: Phytochemical analysis of Green tea and Guduchi

S. No.	Compound	Green tea	Guduchi
1.	Saponins	Positive	Positive
2.	Flavanoids	Positive	Positive
3.	Terpenoids	Positive	Negative
4.	Glycoside	Positive	Negative
5.	Alkaloids	Negative	Negative
6.	Phenol	Positive	Positive
7.	Carbohydrate	Positive	Positive
8.	Tannins	Positive	Positive

H_2O_2 radical scavenging assay

A solution of hydrogen peroxide (2mmol/l) was prepared in phosphate buffer (pH 7.4). Extracts (20–100 µg/ml) were added to hydrogen peroxide solution (0.6 ml). Absorbance of hydrogen peroxide at 230 nm was determined after 10 min against a blank solution containing phosphate buffer without hydrogen peroxide and compared with ascorbic acid, the reference compound.

Table 3: % inhibition of aqueous extract of Ascorbic acid

S.No.	Concentration	%Inhibition at (230nm)		
		Ascorbic acid	Green tea	Guduchi
2	20	63.20	16.27635	16.27635
3	40	65.58	22.95082	22.95082
4	60	75.58	28.33724	28.33724
5	80	85.96	35.83138	35.83138
6	100	92.25	40.04684	40.04684
IC 50		74.581	155.003	169.7683

The *in-vitro* antioxidant potential of Green tea and Guduchi aqueous extract was evaluated by hydrogen peroxide scavenging activity. The studies were carried out taking ascorbic acid as the standard antioxidant which is also a natural antioxidant. The results of antioxidant activity by hydrogen peroxide scavenging activity were expressed in terms of % inhibition of generated free radicals respectively with respect to various concentrations. Concentration dependent effects were observed in each case i.e; higher

concentrations were found to exhibit higher % inhibition in each protocol of the antioxidant study. With reference to the observed IC_{50} value of of Green tea and Guduchi aqueous extract, the antioxidant potential was found to be highest in Guduchi aqueous extract.

From the presented study it can be concluded that the Green tea and Guduchi aqueous extract possess antioxidant activity. The further study on this plant might provide the isolation of some active constituents endering the antioxidant potential.

CONCLUSION

Plants are the potential source of natural antioxidants. 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 Green tea and Guduchi extracts are potential sources of secondary metabolites and their aqueous extracts possess good antioxidant activity. However, further studies are needed to evaluate the *in vivo* potential of these extracts in animal models and also isolation and characterization of the active antioxidant compounds.

REFERENCES

1. Okwu DE. Flavoring properties of spices on cassava fufu, Afr. J. Root Tuber crops. 1999; 3 (2): 19-21.
2. Hill AF. Economic Botany: A textbook of useful plants and plants product. 2nd Edition, Mcgraw Hill, Book company, Inc, New York 1952.
3. Li H, Hao Z, Wang X, Huang L and Li J. Antioxidant activities of extracts and fractions from *Lysimachia foenum-graecum* Hance. Bioresource Technology. 2009; 100; 970–974.
4. Brown MD. Green tea (*Camellia sinensis*) extract and its possible role in the prevention of cancer. Altern Med Rev. 1999; 4:360-370.
5. Nakachi K, Matsuyama S, Miyake S, Suganuma M, Imai K. Preventive effects of drinking green tea on cancer and cardiovascular disease: epidemiological evidence for multiple targeting prevention. Biofactors. 2000; 13:49-54.
6. Khosa RL, Prasad S. Pharmacognostical studies on Guduchi (*Tinospora cordifolia* Miers). J Res Ind Med 1971; 6:261-269.
7. Aiyer KN, Kolammal M. Pharmacognosy of Ayurvedic Drugs. Edn 1, The Central Research Institute 1963, series 1.
8. Evans W C, X Trease and Evans Phamacognose, W.B. Saunders Company Limited, W C, 1998: 315-316.
9. Harborne J B. Phytochemical methods. Chapman and Hall Ltd., London. 1973; 49-188.

10. Ajayi I A, Ajibade O, Oderinde R A, Preliminary phytochemical analysis of some plant seeds, Res. J. Chem. Sci. 2011; 1(3): 58-62
11. The Indian Pharmacopoeia, The controller of publication, Delhi (CSIR) Vol-2, Part II. 1996.
12. Ahmad, R.V. and Sharma, R.K., Evaluation of drug for standardization. Proceedings of WHO trainingcum-workshop, Pharmaceutical lab for Indian medicine, Ministry of health and family welfare, Govt. of India, Ghaziabad 2001.
13. Gupta, A.K., Quality standards of Indian medicinal plants. Indian Council of Medical Research, India Vol-I, 2003.
14. Nagulendran K, Velavan S, Mahesh R, Begum VH, In Vitro Antioxidant Activity and Total Polyphenolic Content of Cyperus Rotundus Rhizomes. 2007; 4(3): 440-449.
15. Ruch RJ, Cheng SJ, Klaunig JF. Prevention of cytotoxicity and inhibition of intracellular communication by antioxidant catechins isolated from Chinese green tea, Carcinogenesis. 1989; 10: 1003–1008.