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A Comparative Study on the Antioxidant Activity of *Andrographis paniculata* and *Costus igneus*

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ABSTRACT

Medicinal plants are traditional uses mainly based on their antioxidant property. Here present work mainly focuses on the anti-oxidant property of extracts of two medicinal plants (*Andrographis paniculata* and *Costus igneus*). The extracts of these plants explain to an increase in free radical scavenging activity and a decrease in inhibition of lipid peroxidation. We will see the results that explain the active anti-oxidant compounds are better extracted in methanol for *Andrographis paniculata* and in ethanol for *Costus igneus* and results also suggest that there is a direct relation between the and anti-oxidant activity and total polyphenols extracted from plants. In present work determination of antioxidant property we find that, these plants are very useful or beneficial for our life due to their phenolic content because antioxidant properties of these plants shows their possibility to reduce the oxidative stress, its work as supplements in diabetes, inflammatory conditions or cancer and liver problems like diseases which are due to increased oxidative stress. So result exhibits both plants having antioxidant properties in aqueous, methanolic and ethanolic solution. *Andrographis paniculata* methanolic extracts and *Costus igneus* methanolic extract were determined for the free radical scavenging and antioxidant properties and we were used DPPH (2,2-diphenyl-1-picrylhydrazyl),ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid), and hydrogen peroxide scavenging. Here we used Ascorbic acid for the comparison of standard antioxidants of both plants and we find *A. Paniculata* methanolic extract has more antioxidant property.

Keywords: DPPH, Antioxidant, Hydroxyl radical, Free radical scavenging, *Andrographispaniculata, Costusigneus*

INTRODUCTION

We know that India is known as country of herbal medicinal plant. In our country since long ago times for good health to used lots of medicinal plants. *Andrographis paniculata* and *Costus igneus* are widely used plants in the ancient times. These are used as medicinal plant and also used as folk medicine for cure of different diseases and these plants are used for many diseases are also being treated like diarrohea, malaria, diabetic, alzeimeretc. Many medicinal plants are also useful for us. So we need to think more about it and believe in naturopathy, we need to use more n more Ayurvedic medicine as well as homoeopathic medicine. Because its also prepared by various medicinal plants like Kalmegh, Insulin plants, Azadirachtaindica, Curcuma longa, Costus speciosus, Osimumbasillicum, Solanumindicum, etc. So that we can say medicinal plants play very important role in our health treatement. In modern cultures Ayurvedic medicines totally based on plants or plant extract. Ayurvedic drugs and their formulations to treat various human diseases or ailments because they contain the components of therapeutic value [1]So in the present work we study about two Indian medicinal plants *Andrographis paniculata*(King of Bitters) and *Costus igneus* (Insulin plant). Both plants exhibit antioxidant property. So Herbal plants are the richest bio-resource on drugs, modern medicines, folk medicines, pharmaceutical intermediates, chemical entities and also food supplements also. There is a wide possibility to utilize herbal products to supplement the diet. Because with this intention of improving the quality of human life and preventing the diseases of people.

Andrographis paniculata is generally known as “King of Bitters” and commonly known as creat or green chirayata. It belongs to the family Acanthaceae. Its herbaceous plant are found in China, India, Shrilanka and Malasiya. This plant is one of the most highly used potential medicinal plant in world. It has been traditionally used in Asian countries, well known for its blood purifying property. A.paniculata extract or its compound andrographolide plays an important role in controlling diabetes by acting as an scavanging of free radicals or by counter acting the free radicals by acting as an antioxidants [4]. Andrographolide, is main active constituent of *A. paniculata*, it is a diterpenoid lactone having pharmacological effects specially used in Ayurveda, Unani, homoeopathy and Chinese medicine system [2]. So we find that the methanolic extract exhibited the greater anti-oxidant activity in fruit and leaves also. Extract of this plant exhibits various pharmacological properties like anti-typhoid, antifungal activity ,antioxidants, anti-inflammatory, anti-snake venom and antipyretic properties [5] and also extra pharmacological properties anti-malerial, antifungal activity, antidiabetic, tumour treatment, anti HIV activity, antidiarrheal, a paniculataplant is very useful to the human being in all types of health problems in the vital organ of the body. *Andrographis paniculata* contains a number of diterpenoids, flavonoids because it is main chemical constituents of *Andrographis paniculata*. Its bitter taste is due to its major constituent andrographolide, as well as several other chemical constituents are like andrographolide, 14 deoxy 11 oxoandrographolide, dehydroandrographolides, Neoandrographolide (nonbitter in taste), andrographin and others. The whole plant contains flavonoids. The leaves, seeds, stem and aerial parts of *Andrographis paniculata* are used in various ailments.

Costus igneus plant is Indian plant and its generally known as Insulin plants. It is green herbaceous plant and it is found in South region of India and central region of America. It is also called Spiral flag. This plant also shows antioxidant properties like *Andrographis paniculata*. This plant is easily grown in any type of soil or field. *Costus igneus* plants leaves are the source of dietary supplement for diabetic patients, means it works as a insulin hormone. This plant belongs to Costaceae family. The *Costus igneus* plant is generally smooth, dark green large, larger leaves, 4-6 inch diameter, orange flowers are produced in the summer months. It exhibit various pharmacological activities like antioxidant, anti-microbial, anti-cancerous, diuretic. *Costus igneus* leaves are rich in antioxidant, protein and iron, components such as terpenoids, steroids, and flavonoids, ascorbic acid, α-tocopherol, β-carotene. The leaves of this plants mainly contains corosollic acid and ascorbic acid [3]. It is beneficial for us to treat urinary infection and food poisoning disease (Figure 1 and 2).

Figure 1: Plants growing in the environment.

Figure 2: *Andrographis paniculata* Plant –Flower, Extract and Powder form.

METHODOLOGY

Plant material collection

At first we collect fresh and green leaves *of Andrographis paniculata* and *Costus igneus* at the same time and washed properly with distilled water and dried for one week in shade. To take leaves after dry than its make powder by grinding process and then coarse powder formed. Now it was stored in air tight bottles or jar.

Preparation of plants extract

After plant material collection we take 100 gm dried powder of *A. paniculata* and *Costus igneus* was extracted in 500 mL of the extraction solvent (distilled water, ethanol and methanol) using soxhlet apparatus. This extracts were concentrated to dryness and their yield was crude residues. The extracts were auto-claved than after stored at between 3 to9°C.

Determination of total phenolic content

This method we used Folin-Ciocalteu's reagent, 80% ethanol, 20% $Na2CO_3$, standard phenolic compound with gallic acid. To determine the total soluble phenolic content of *A. paniculata* and *Costus igneus*. We take 0.5 mL of 10% freshly prepared Folin-Ciocalteu's reagent mixed with one by one each solvent extracted solution and after few minutes, we added 2 mL of 7-8 % $Na2CO_3$ and mixed thoroughly. The solution take in test tube, were placed in boiling water for exactly 1 minutes, than after cooled and measure the absorbance in a spectrophotometer at (650 nm) against are agent blank. The concentrations of the total phenolic compounds were obtained by absorbance of gallic acid. In this graph showed: three times repeated experimental value and concentration of total phenols (mg/g) of dry extract [4].

Determination of flavonoids

For determination of total soluble flavonoid content we used Aluminium chloride colorimetric method. In this method firstly we take three types solvent (aqueous, methanolic and ethanolic) with extracts of *A. paniculata* and *Costus igneus* 2 g/mL of the extract,1.0 mL of stock solution 2.0 mL methanol and 0.2 ml potassium acetate (1 M) was added to reaction in test tubes and added distilled water till volume upto 5 ml than after at room temperature for half an hour in incubation. The reaction mixtures absorbance was measured at 415 nm in spectrophotometer.

Determination of anti-oxidant activity

The antioxidant activity was determined on basis of free radical scavenging activity of stable 1,1 Di phenyl 1-2 picryl Hydrazyl (DPPH).this DPPH stable radical was examined according to method developed. In 5 ml volumetric flasks added 2ml.of DPPH solution and 0.5 ml of TRIS buffer , 2 ml of methanol, 0.5 ml of prepared dilutions. Also the control absorbance of DPPH was taken by replacing 0.5 ml of prepared dilution with methanol. The absorbance of all further made dilutions made in 5ml volumetric flasks were taken after 30 minutes at max wavelength 517nm using methanol as blank.

The percentage inhibition was calculated using the formula. All determination was done in triplicate. The percentage of DPPH scavenging was calculated using the following formula:

% Scavenging = [(A control - (A sample – A sample blank /A control))] × 100

RESULTS AND DISCUSSION

In this study, Aqueous, methanolic and ethanolic extracts of leaves of *Andrographis paniculata* and Costus igneus have been investigated. We determined total phenolic and total flavonoid contents. Anti-oxidant activities by using DPPH radical scavenging activity. So in the present study total phenolic content and flavonoid content of different extracts of both plants is presented in Table 1. It is clear that level of polyphenols and flavonoid content in the methanolic extract of *Andrographis paniculata* leaves was higher than ethanol and aqueous extracts of self and methanol, ethanol and aqueous extracts of *Costus igneus* (Tables 1 and 2, Figures 3 and 4).

Table 1: *Andrographis paniculata* extracts: Total phenolic content (TPC) and flavonoid content.

S. No.	Plants name	Solvent	Total phenols (mg/g)	Flavonoid content (mg/g)
1	*A. paniculata*	Aqueous	18.02 ± 0.002	0.14 ± 0.03
2		Methanol	26.52 ± 0.003	0.59 ± 0.03
3		Ethanol	22.09 ± 0.004	0.38 ± 0.03

Table 2: *Costus igneus* extracts: Total phenolic content (TPC) and flavonoid content.

S. No.	Plants name	Solvent	Total phenols (mg/g)	Flavonoid content (mg/g)
1	*Costusigneus*	Aqueous	1.0 ± 0.3	0.11 ± 0.03
2		Methanol	6.3 ± 0.1	0.43 ± 0.02
3		Ethanol	6.2 ± 0.5	0.57 ± 0.03

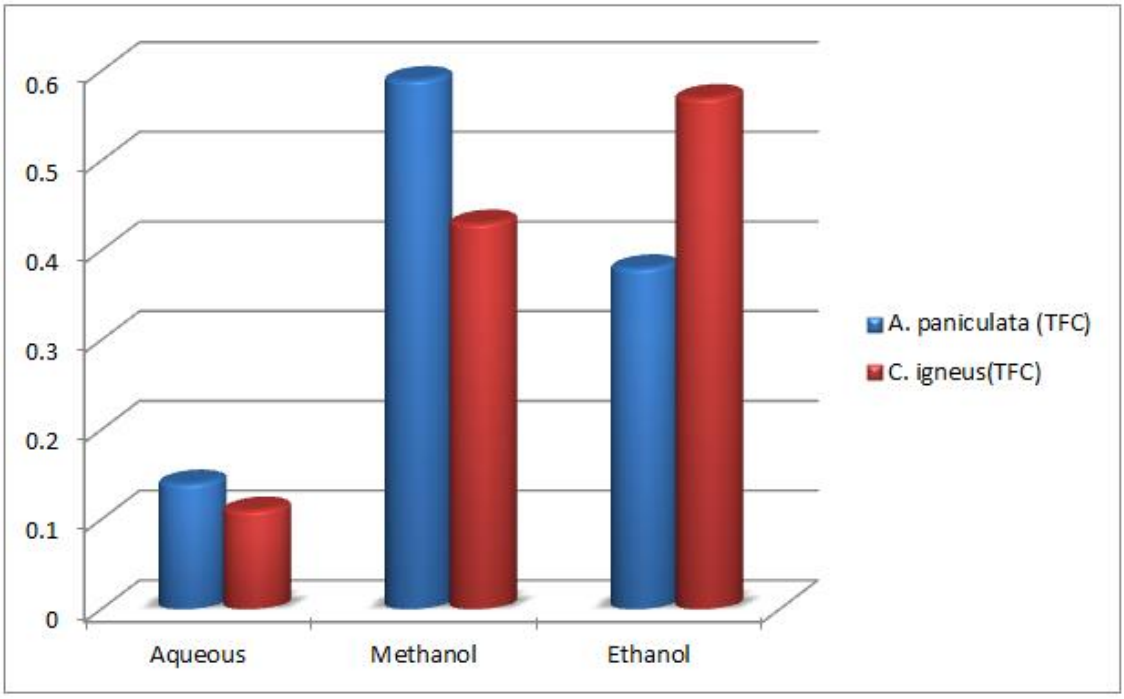

Figure 3: Total Phenolic Content Comparison between *A. paniculata* and *C. igneus.*

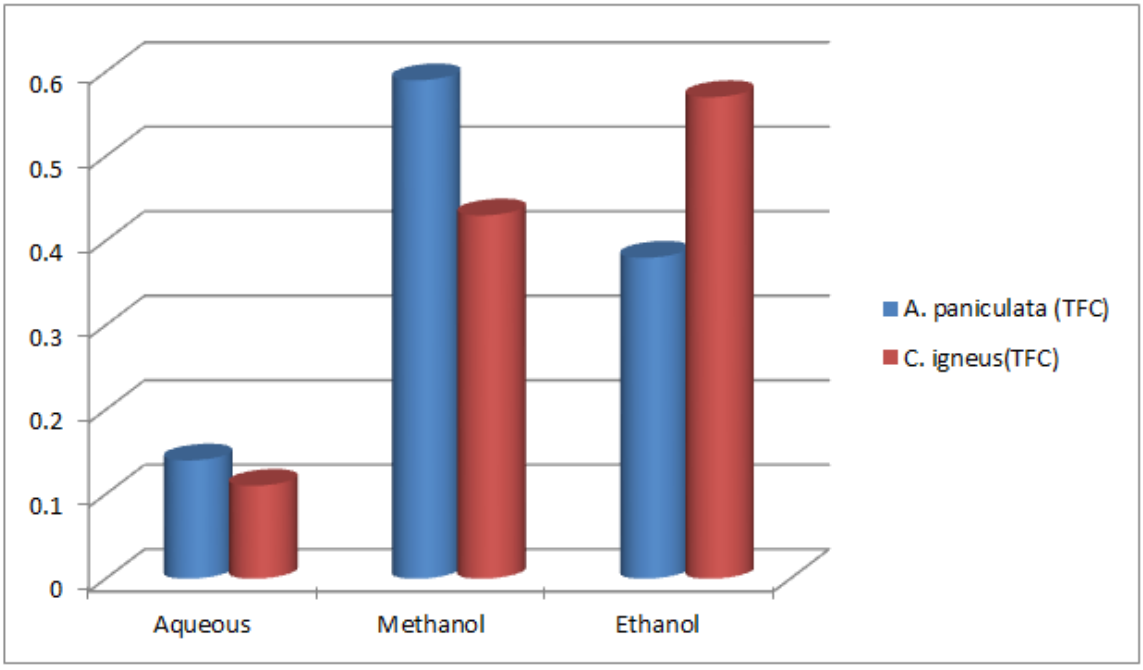

Figure 4: Total Flavonoid Content Comparison *A. paniculata and C. igneus*.

Antioxidant properties are directly correlated with their phenolic constituents and flavonoids. This property of flavonoids is due to free radical scavenging because they can react with active oxygen radicals, such as hydroxyl radicals, superoxide anion radicals and lipid peroxyl radicals and inhibit the lipid peroxidation at an early stage. This is because of their scavenging ability due to their hydroxyl groups [5]. In this result we can see leaves extract of *A. paniculata* and *Costus igneus* (total phenolic and flavonoid content) clearly show that total phenolic content in methanolic extract of *A. paniculata*

had highest 26.52 mg/g and flavonoid content is 0.59 mg/g respectively followed by ethanolic extract and lowest in aqueous extract. The present research work suggests that medicinal plants which possess good antioxidant potential and it is very beneficial for our human health from various diseases. Flavonoids are phenolic acids, that act as an important source of antioxidants in different medicinal plants. It is reported that the phenolic are responsible for the anti-oxidant activity of the plant. Reducing power and DPPH radical scavenging activity are strongly related with antioxidant property reducing power may serve as a significant reflection of the anti-oxidant activity. For the determination of primary anti-oxidant activity we used stable radical DPPH. The DPPH anti-oxidant is based on the ability of DPPH.

CONCLUSION

The result obtained from our work we got *Andrographis paniculata* (methanolic extract) had highest antioxidant properties than *Costus igneus* extract. Both plants are very useful and exhibit medicinal properties against various ailments. In our daily life oxidative stress conditions the production of ROS that increase in medicinal plant after we find that result is induction of oxidative stress. The flavonoid content was maximum in methanol extract but phenolic content of water and ethanol extract is minimum .So this study suggests that methanolic extract is highly potent antioxidant activity than other extracts of ethanolic and aqueous. In this research work methanol extracts of the total content of polyphenols and flavonoids in the studied, we got both plants extract were positively correlated with their antioxidant properties.

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