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Comparative phytochemical analysis and total phenolic content of indigenous spices

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ABSTRACT

The necessity of culinary herbs in human life, spices plays a major role as they are versatile in feature. Indigenous spices, the spices which is cultivated and developed naturally in its own place (India). This current research was to compare and analyse the phytochemical and total phenolic content of indigenous spices. The major indigenous spices which we are using in day to day life such as *Elletaria cardamomum* (cardamom), *Cinnamomum verum* (Cinnamon), *Cuminum cyminum* (Cumin), *Trigonella foenum-graecum* (Fenugreek), *Coraindrum sativum* (Coriander). The phytochemical analysis tests such as test for carbohydrates, flavanoids, alkaloids and terpenoids were done using the extract of above mentioned spices. The phenolic content was measured using folin ciolcaletu's reagent. The phytochemicals such as phylobattaninns, carbohydrates, flavanoids, alkaloids and terpenoids were present in the collected indigenous spices. The comparative phytochemical analysis and total phenolic content of selected indigenous spices was found and its uses were compared.



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INTRODUCTION

Phytochemistry is the study of phytochemical which are the secondary metabolic substances found in plants. Phytochemical play a vital role against number of diseases such as asthma, arthritis, cancer, etc. (Yusuf, 1991). In medicinal purpose, phytochemical do not have any side effects. It is otherwise called as "man friendly medicines" because it do not harm any human beings (Vikrant *et al.*, 2012). Spices have been closely connected to the cultural traditions, preservation, medicine were used in India. Spices are the major key component in India for the

external trade with the neighbouring civilisation before 7000 years ago (Campos *et al.*, 2011). Recent studies have shown that many dietary polyphenols from certain plants are more effective antioxidants (Nonaka *et al.*, 1983). The use of these spices will be mainly found by the phytochemical analysis and total phenolic content of major indigenous spices.

Cinnamon is one of the major spices in India. It has proven to be a rich source of calcium, fibre and manganese, as well as possessing antifungal, antimicrobial, antibacterial, antiviral and antioxidant properties. Polyphenols present in the cinnamon can help by protect the body from free radicals. It also helps in preventing the heart disease by reducing total cholesterol level and triglycerides as well (Ullagaddi and Bondad, 2011). Cardamom is a spice made from the seeds of genera *Elettaria* and *Amomum* in the family Zingiberaceae. It is also one of the major spices used in India. Cardamom is used for digestion problems, heartburn, intestinal problems, constipation, liver and gallbladder complaints and loss of appetite. It has the major medicinal properties against common cold, cough, bronchitis, some throat infections and urinary

problems. Cumin seeds mainly have antifungal, antioxidant and anti-flatulent properties because of their abundant phytochemicals present in it. Cumin rich in Vitamin E which maintains a healthy and glowing skin. Cumin being a good source of dietary fibre helps in detoxification. Recent studies revealed that the essential oil of cumin is useful against bacterial infections (Mizanur *et al.*, 2017).

Fenugreek, an annual herb with light green leaves and small white flowers is of the pea family. It is also addressed as Greek Hay. Because of its phytochemical content fenugreek used as a remedy for indigestion, fever and baldness. Major studies about fenugreek reveals that it is used in controlling lipids and blood glucose level (Singletary Keith, 2017). Coriander is source of dietary fibre containing manganese, iron and magnesium. Its leaves are rich in vitamin C, vitamin K and protein. Coriander decreases bad cholesterol (LDL) and increases the levels of good cholesterol (HDL). Vitamin K present in it is good for the treatment of Alzheimer's disease. Coriander is also said to possess anti-inflammatory properties thereby being effective against inflammatory diseases such as arthritis (Ullagaddi and Bondada, 2011, Laribi *et al.*, 2015).

MATERIALS AND METHODS

Collection and preparation of plant materials

The selected spices samples were collected locally. The collected samples were washed, dried and crushed into powdered form. The plant powder was taken in a test tube, mixed with distilled water and shaken well. The solution was then filtered in the filter paper and the extract was used for phytochemical analysis and total phenolic content test (Balakrishnan, 2015).

Phytochemical analysis

Test for phylobattaninns

The extract of all the sample spices was taken in a test tube, 1% of aqueous HCl was added and each sample was then boiled with the help of hot plate stirrer. Formation of red coloured precipitate confirms the presence of phylobattaninns.

Test for carbohydrates

Fehling's solution Test: Fehlings solution of A and B both were added with the extract and boiled. A red colour precipitate indicated the presence of reducing sugars.

Benedict's reagent test: 2ml of Benedict's reagent was boiled in a test tube and mixed with extract. A reddish-brown precipitate indicated the presence of carbohydrates (Rui Hai Liu, 2003).

Test for flavonoids

Plant extract was mixed with 2ml of 2% NaOH solution, an intensive yellow colour was formed, which turned colourless when added 2 drops of diluted acid. This indicates the presence of flavonoids (Dorman and Dens, 2002).

Test for alkaloids

0.2g of selected plant samples was taken in a separate test tube and 3ml of hexane was added in each test tube and mixed well. Then 5ml of 2% HCl was added to the test tube having extract and hexane. Heated the test tube having mixture, filtered it and poured two drops of picric acid in the mixture and the formation of yellow coloured precipitate indicate the presence of alkaloids.

Test for terpenoids

2ml of chloroform was mixed with the extract and evaporated on water bath then boiled with 2ml of concentrated sulphuric acid. A grey colour produced indicated the presence of terpenoids.

Test for total phenolic content

Test for total phenolic content of the given extract samples are done using Folin ciolcaletu's reagent (Pourmorad *et al.*, 2006).

RESULTS

The preliminary phytochemical test indicates the presence of phylobattaninns, carbohydrates, flavonoids and terpenoids in the collected indigenous spices samples (Table 1). The total phenolic content of the extracts of the collected indigenous spices was quantitatively calculated and it was found to be 0.21mg/gm for cardamom, 0.38mg/gm for cinnamon, 0.22mg/gm for cumin, 0.72mg/gm for fenugreek, 0.20mg/gm for coriander, the extract was expressed as gallic acid equivalent (GAE) (Table 2).

DISCUSSION

Phytochemicals found in these selected indigenous spices have been found to have a wide range of chemical and medicinal properties which on further medicinal applications can be effective against numerous diseases (Pourmorad *et al.*, 2006). Phytochemicals mainly act upon the promoting, maintaining and repairing in cells, tissues collectively the whole human body functions. The phytochemicals that are frequently associated with human health are carotenoids and tocopherols. Important medicinal phytochemicals including, terpenoids, reducing sugar, flavonoids, alkaloids and phylobatannins were found to be present in the spices sample (Daya *et al.*, 2011).

Phytochemicals are chemical compounds formed during the plants normal metabolic process. Its

Table 1: Phytochemical chemical analysis of selected indigenous spices

Phytochemicals	Cardamom	Cinnamon	Cumin	Fenugreek	Coriander
Phylobattaninns	+	+++	+	++	+
Carbohydrates	++	++	+++	+++	+++
Flavonoids	+++	+++	+++	++	++
Alkaloids	+++	+++	+++	+++	+++
Terpenoids	+++	+	++	++	++

+++ - Highly present; ++ - Moderately present; + - Least present

Table 2: Phenolic content of selected indigenous spices

Extract	Phenolic content
Cardamom	0.21mg GAE/gm
Cinnamon	0.38mg GAE/gm
Cumin	0.22mg GAE/gm
Fenugreek	0.72mg GAE/gm
Coriander	0.20mg GAE/gm

defined as a bioactive non-nutrient plant compounds present in vegetables, fruits, pulses, grains, etc. Alkaloids are made largely of ammonia compounds comprising basically of nitrogen bases synthesized from amino acid building blocks with various radicals replacing one or more of the hydrogen atoms in the peptide ring, most containing oxygen and it is a largest secondary metabolite (Panche *et al.*, 2016). These compounds have basic properties and are alkaline in nature, turning red litmus paper blue. Flavanoids are the compounds derived from the parent compounds known as flavans. Quercetin, quercitrin and kaempferol are the common flavonoids present in the 70% of plants (Saraswathy *et al.*, 2001). Though the concentration of terpenoids and phylobattaninns was low, they play a major role and act as an antiinflammatory, expectorant, bronchodilator and local antiseptic. This is beneficial for patients who experience insomnia when consuming cannabin and they express some analgesic properties also.

CONCLUSION

The preliminary tests of phytochemical analysis indicate the presence of alkaloids, flavonoids, reducing sugars, terpenoids and total phenolic content in the selected indigenous spices which reveals its medicinal properties and its uses for the future medicine world. Presence of phenol in all the extracts reveals its antioxidant potential and its health benefits.

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