

Phytochemical Analysis of Some Selected Spices

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Abstract - Spices have been defined as plant substances from indigenous or exotic origin, aromatic or with strong taste, used to enhance the taste of foods. Herbs and spices have been used during the middle Ages for flavouring, food preservation, and/or medicinal purposes. The present study was carried out on the four spices, Cinnamomum verum (Cinnamon), Illicium verum (Star anise), garlic cloves (Allium sativum), and dried turmeric powder (Curcuma longa), Capsicum Annuum L. Coriandrum Sativum L. Dhane Piper Nigrum L -Mire Ferula Asafoetida L- Hing TrigonellaFoenum-Graecum L-Methi Zingiber Officinale Rosc. Sunth to determine their phytochemical constituents and were proved to have the potential to act as a source of useful drugs and also to improve the health status of the consumers as a result of the presence of various compounds that are vital for good health.

Keywords - Spices, Phytochemicals, Cinnamomum verum (Cinnamon), Illicium verum (Star- anise), Garlic cloves (Allium sativum), Curcuma longa.(turmeric powder). Capsicum Annuum L. Coriandrum Sativum L. Dhane Piper Nigrum L -Mire Ferula Asafoetida L- Hing TrigonellaFoenum-Graecum L-Methi Zingiber Officinale Rosc. Sunth

INTRODUCTION

Plants have been used to treat or prevent illness since before recorded history. The sacred Vedas dating back between 3500 B.C and 800 B.C give many references of medicinal plants. One of the remotest works in traditional herbal medicine is “*Virikshayurveda*”, compiled even before the beginning of Christian era. “*Rig Veda*”, one of the oldest available literatures written around 2000 B.C. mentions the use of Cinnamon (*Cinnamomum verum*), Ginger (*Zingiber officinale*), Sandalwood (*Santalum album*) etc. not only in religious ceremonies but also in medical preparation.

Aims and objective

1. Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body.
2. Plants and plant-based medicaments are the basis of many of the modern pharmaceuticals we use today for our various ailments. The discovery of medicinal plants has usually depended on the experience of the populace based on long and dangerous self-experiment. Progress over the centuries towards a better understanding of a plant derived medicine has depended on two factors that have gone hand in hand. One has been the development of increasingly strict criteria of proof that a medicine really does what it is claimed to do and the other has been the identification by chemical analysis of the active compound in the plant (Holiman, 1989). According to world health organization (WHO), more than 80% of the world’s population relies on traditional medicines for their primary health care needs.
3. The medicinal value of Spices, which include leaves (coriander, mint), buds (clove), bulbs (garlic, onion), fruits (red chili, black pepper), stem (cinnamon), rhizomes (ginger), star anise, cinnamon (bark) and other plant parts, have been defined as plant substances from indigenous or exotic origin, aromatic or with strong taste, used to enhance the taste of foods. Herbs and spices have been used during the middle Ages for flavoring, food preservation, and/or medicinal purposes. Only a small percentage of plants species have been investigated phytochemically and the fraction submitted to biological screening is even smaller [4]. Several studies have attributed the antimicrobial, antioxidant and pharmaceutical properties of spices and herbs to their phenolic compounds

MATERIALS AND METHODS

Materials And Methods For Phytochemical Analysis

Extraction methods used pharmaceutically involves the separation of medicinally active portions of plant tissues from the inactive/inert components by using selective solvents. During extraction, solvents diffuse into the solid plant material and solubilize compounds with similar polarity

The purpose of standardized extraction procedures for crude drugs (medicinal plant parts) is to attain the therapeutically desired portions and to eliminate unwanted material by treatment with a selective solvent known as menstrum. The extract thus obtained, after standardization, may be used as medicinal agent as such in the form of tinctures or fluid extracts or further processed to be incorporated in any dosage form such as tablets and capsules. These products contains complex mixture of many medicinal plant metabolites, such as alkaloids, glycosides, terpenoids, flavonoids and lignins.

The general techniques of medicinal plant extraction include maceration, infusion, percolation, digestion, decoction, hot continuous extraction (Soxhlet), aqueous-alcoholic extraction by fermentation, counter-current extraction, microwave-assisted extraction, ultrasound extraction (sonication), supercritical fluid extraction, and phytonic extraction (with hydro fluorocarbon solvents). For aromatic plants, hydro distillation techniques (water distillation, steam distillation, water and steam distillation),

hydrolytic maceration followed by distillation, expression and enfl eurance (cold fat extraction) may be employed. Some of the latest extraction methods for aromatic plants include headspace trapping, solid phase micro-extraction, protoplast extraction, micro distillation, thermo micro distillation and molecular distillation

Plant material

plants are used in the dry form (or as an aqueous extract) by traditional healers and due to differences in water content within different plant tissues, plants are usually air dried to a constant weight before extraction. Other researchers dry the plants in the oven at about 40°C for 72 h. In most of the reported works, underground parts (roots, tuber, rhizome, bulb etc.) of a plant were used extensively compared with other above ground parts in search for bioactive compounds possessing antimicrobial properties

Water	Chloroform	Ether	Acetone
Tannins	Terpenoids	Alkaloids	Flavonols
Saponins		Fatty acids	
Terpenoids		Coumarins	
Polypeptides			
Lectins			
Anthocyanins			

Table 3.1: Solvents used for active component extraction

Spices Ten samples of spices *Cinnamomum verum* (Cinnamon), *Illicium verum* (Star- anise), Garlic cloves (*Allium sativum*), *Curcuma longa*.

(turmeric powder). *Capsicum Annuum L. Coriandrum Sativum L. Dhane Piper Nigrum L -Mire Ferula Asafoetida L- Hing TrigonellaFoenum-Graecum L-Methi Zingiber Officinale Rosc. Sunth* were used in this study

Preparation of ethanolic extracts

Samples of spices were pulverized and extracted twice in ethanol (1:10 w/v) at room temperature for 48 hrs and filtered. The filtrates were concentrated to dryness under reduced conditions at room temperature. Dried extracts were then suspended in dimethyl sulfoxide (DMSO) for further use.

PHYTOCHEMICAL SCREENING TEST

A. Test for carbohydrates:

Equal volumes of Benedict's reagent and test solution were mixed in attest tube. The mixture was heated in boiling water bath for 5 minutes. Solution appeared green showing the presence of reducing sugar.

B. Tests for Proteins: Xanthoproteic test:

To 1ml of extract, 1ml of conc.H₂SO₄ was added. This resulted in the formation of white precipitate which on boiling turned yellow. On addition of NH₄OH, yellow ppt. turned orange.

C. Test for Steroids: Salkowski Test:

To 2ml of aqueous extract, 2ml of chloroform and 2ml of conc.H₂SO₄ was added. The solution was shaken well. As a result chloroform layer turned red and acid layer showed greenish yellow fluorescence.

D. Tests for alkaloids: The aqueous extract was evaporated in a test tube. To the residue dilute HCl was added shaken well and filtered. With the filtrate following tests were performed.

Hager's Test- To the 2-3ml of filtrate hager's reagent was added. Yellow ppt was formed showing the presence of alkaloids.

Mayer's Test- To the 2-3 ml of filtrate Mayer's reagent was added. Formation of yellow precipitate showed the presence of alkaloids.

With tannic acid- To 1ml of extract add 2-3 drops of the tannic acid solution reagent, appearance of amorphous or crystalline precipitate represents the presence of alkaloid.

F. Test for saponins- Drug extract was shaken vigorously with water. No persistent foam was formed.

G. Test for Tannins- For 2ml of extract add few drops of 1% lead acetate. A yellowish precipitate showed the presence of tannins.

H. Test for Anthocyanins- 2ml of aqueous extract is added to 2ml of 2N HCl and ammonia. The appearance of pink red turns blue violet indicates the presence of anthocyanins.

I. Test for coumarins- 3ml of 10% NaOH was added to 2ml of aqueous extract formation of yellow color indicates the presence of coumarins.

OBSERVATION AND RESULTS

Table 1: Preliminary qualitative phytochemical analysis of some SPICES (salvent- water)

SR.NO.	Name of plants	Phytochemical test									
		Al	St	Ph	Tan	Sap	An	Cou	Car	Pro	A A
1	<i>Capsicum Annuum L.</i>	-	-	-	-	-	-	+	-	-	-
2	<i>Illicium Verum Hook Star-annis</i>	-	-	-	-	+	-	-	-	-	-
3	<i>Cinnamomum versum Dalchini</i>	-	-	-	-	+	-	-	+	-	-
4	<i>Allium sativum Garlic</i>	-	-	-	-	+	-	-	-	+	+

5	<i>Curcuma longa Haldi</i>	-	-	-	-	-	-	-	+	-	-
6	<i>Coriandrum Sativum L. Dhane</i>	-	-	-	+	-	-	+	-	-	-
7	<i>Piper Nigrum L –Mire</i>	-	-	-	-	+	-	-	-	-	-
8	<i>Ferula Asafoetida L- Hing</i>	-	-	-	-	+	-	-	-	+	+
9	<i>TrigonellaFoenum-Graecum L-Methi</i>	-	-	+	+	-	+	+	-	+	-
10	<i>Zingiber Officinale Rosc. Sunth</i>	-	-	-	-	+	-	-	-	-	-

Table 2: Preliminary qualitative phytochemical analysis of some SPICES (salvent-Chloroform)

SR. NO	Name of plants	Phytochemical test									
		Al	St	Ph	Tan	Sap	An	Cou	Car	Pro	A A
1	<i>Capsicum Annuum L.</i>	-	-	-	-	-	-	-	-	-	-
2	<i>Illicium Verum Hook Star-annis</i>	-	-	-	-	-	-	-	-	-	-
3	<i>Cinnamomum versum Dalchini</i>	-	-	-	-	-	-	+	+	+	-
4	<i>Allium sativum Garlic</i>	-	-	+	-	-	-	-	-	-	-
5	<i>Curcuma longa Haldi</i>	-	+	-	-	-	-	-	+	-	-
6	<i>Coriandrum Sativum L. Dhane</i>	-	-	-	-	-	-	+	-	-	-
7	<i>Piper Nigrum L –Mire</i>	-	-	-	-	-	-	-	-	-	-
8	<i>Ferula Asafoetida L- Hing</i>	-	-	-	-	-	-	-	-	+	+
9	<i>TrigonellaFoenum-GraecumL-Methi</i>	-	-	-	-	-	-	-	-	-	-
10	<i>Zingiber Officinale Rosc. Sunth</i>	-	+	-	-	-	-	-	-	-	-

(+) Indicate the presence of phytochemicals and (-) Indicate the absence of phytochemicals

Abbreviations

Al: Alkaloids St. Steriods; Ph: Phenols; Tan: Tannins; Sap: Saponins; An: Anthocyanin, Cou; coumarin. Car; Carbohydrates ;Pro; Proteins AA: Aminoacids

Table 3: Preliminary qualitative phytochemical analysis of some SPICES (salvent-ETHANOL)

SR.NO.	Name of plants	Phytochemical test									
		Al	St	Ph	Tan	Sap	An	Cou	Car	Pro	A A
1	<i>Capsicum Annuum L.</i>	-	+	-	-	-	-	-	-	+	+
2	<i>Illicium Verum Hook Star-annis</i>	-	-	-	+	-	-	-	-	-	-
3	<i>Cinnamomum versum Dalchini</i>	-	+	+	-	+	-	-	+	-	-
4	<i>Allium sativum Garlic</i>	-	-	+	-	-	-	+	-	+	+
5	<i>Curcuma longa Haldi</i>	-	+	-	+	-	-	-	+	-	-
6	<i>Coriandrum Sativum L. Dhane</i>	-	-	-	+	-	-	+	-	-	-
7	<i>Piper Nigrum L –Mire</i>	+	-	-	-	+	-	+	+	+	-
8	<i>Ferula Asafoetida L- Hing</i>	-	-	-	-	+	-	-	-	+	+
9	<i>TrigonellaFoenum-GraecumLmethi</i>	+	+	-	+	+	+	+	-	-	+
10	<i>Zingiber Officinale Rosc. Sunth</i>	+	-	-	+	+	-	+	-	-	-

Table 4: Preliminary qualitative phytochemical analysis of some SPICES- RESULT

SR.NO.	Name of plants	Phytochemical test									
		Al	St	Ph	Tan	Sap	An	Cou	Car	Pro	A A
1	<i>Capsicum Annuum L.</i>	-	+	-	-	-	-	+	-	+	+
2	<i>Illicium Verum Hook Star-annis</i>	-	-	-	+	+	-	-	-	-	-
3	<i>Cinnamomum versum Dalchini</i>	-	+	+	-	+	-	+	+	+	-
4	<i>Allium sativum Garlic</i>	-	-	+	-	+	-	+	-	+	+
5	<i>Curcuma longa Haldi</i>	-	+	-	+	-	-	-	+	-	-
6	<i>Coriandrum Sativum L. Dhane</i>	-	-	-	+	-	-	+	-	-	-
7	<i>Piper Nigrum L –Mire</i>	+	-	-	-	-	-	+	+	+	-
8	<i>Ferula Asafoetida L- Hing</i>	-	-	-	-	-	-	-	-	-	+
9	<i>TrigonellaFoenum-GraecumLmethi</i>	+	+	+	+	+	+	+	-	+	+
10	<i>Zingiber Officinale Rosc. Sunth</i>	+	+	-	+	+	-	+	-	-	-

(+) Indicate the presence of phytochemicals and (-) Indicate the absence of phytochemicals

Abbreviations

Al: Alkaloids **St.** Steroids; **Ph:** Phenols; **Tan:** Tannins; **Sap:** Saponins; **An:** Anthocyanin, **Cou;** coumarin. **Car;** Carbohydrates **Pro;** Proteins AA: Aminoacids

RESULTS AND DISCUSSION

The present study carried out on the four spices i.e., *Cinnamomum verum* (Cinnamon), *Illicium verum* (Star anise), *Allium sativum* (garlic cloves), and *Curcuma longa* (turmeric powder), were used in this study and revealed the presence of medicinal active constituents. The phytochemical active compounds of these spices were qualitatively analyzed separately and the results are presented in Table 1. In these screening process alkaloids, tannins, saponins, flavonoids and terpenoids, glycosides, phenols shows different types of results in different solvents. The medicinal value of plants lies in some chemical substances that have a definite physiological action on the human body. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. For example, alkaloids protect against chronic diseases. Saponins protect against hyper cholesterolemia and antibiotic properties Steroids and triterpenoids show the analgesic for central nervous system activities. Phytochemical screening of the various extracts of *Cinnamomum verum* (Cinnamon), *Illicium verum* (Star anise), *Allium sativum* (garlic cloves), and *Curcuma longa* (turmeric powder) were used to study the presence of contained alkaloids, flavonoids, steroids, saponins, tannins and triterpenoid and also have various medicinal values such as anti-inflammatory, anti diabetic and analgesic activities and for central nervous system activity. The importance of alkaloids, saponins and tannins in various antibiotics used in treating common pathogenic strains has recently been reported by (Kubmarawa Mensah, 2008)

CONCLUSION

The spices have been screened for phytochemical constituents seemed to have the potential to act as a source of useful drugs and also to improve the health status of the consumers as a result of the presence of various compounds that are vital for good health.

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