

Phytochemical Screening and Pharmacological Applications of Some Selected Indian Spices

Deepali D. Kadam¹, Pramod C. Mane², Ravindra D. Chaudhari³

Zoology Research Centre, Shri Shiv Chhatrapati College of Arts, Commerce and Science, Junnar, Savitribai Phule Pune University, (M S)
410 502, India

Abstract: Spices have been added to foods since ancient times, not only as flavoring agents, but also as folk medicines and food preservatives. The current investigation deals with the extraction and phytochemical analysis of *Syzygium aromaticum*, *Piper nigrum* and *Cinnamomum verum* which are one of the most important spices used in India. The presence of phytochemicals including phytosterols, saponins, alkaloids, phenolic compounds, tannins, proteins, glycosides, flavonoids, carbohydrates, quinones, coumerin, terpenoids, anthocyanins and emodins were determined for their presence. Phytosterols, glycosides and terpenoids were present in all the species. Saponins and carbohydrates are present only in *Syzygium aromaticum*, while proteins are found in *Piper nigrum*. While anthocyanins and emodins were absent in the extracts of all the studied spices. It is concluded that the extracts of all the studied spices consists of important constituents having pharmacological activities.

Keywords: phytochemistry, spices, *Syzygium aromaticum*, *Piper nigrum* and *Cinnamomum verum*.

1. Introduction

Spices are used for flavoring, coloring or preserving the food. They are either used in the form of dried seed, fruit, root, bark, vegetable substances. Thomas *et al.* (2012) mentioned that, many spices have antimicrobial properties. Because of this, spices are more commonly used in warmer climates, which have more infectious disease, and also used in preservation of meat, which is particularly susceptible to spoiling. Spices have many other uses like medicinal, religious ritual, cosmetics or perfume production, or as a vegetable. For example, turmeric is used for cooking recipe and garlic as an antibiotic. A variety of spices grown across the Indian subcontinent (a sub-region of South Asia) are used in the diet. With different climates in different parts of the country, India produces a variety of spices, many of which are native of the Subcontinent, while others were imported from similar climates and have since been established and cultivated locally for centuries.

Syzygium aromaticum commonly known as cloves are the aromatic flower buds of a tree in the family Myrtaceae. Cloves are used in Indian Ayurvedic medicine, Chinese medicine, and Western herbalism. Cloves are used as a carminative, to increase hydrochloric acid in the stomach and to improve peristalsis. Cloves are also said to be a natural anthelmintic and also applied to a decayed tooth cavity. It also relieves toothache, reported by Alqareer *et al.* 2012.

Shiva Rani *et al.* (2013) mentioned that *Piper nigrum*, commonly known as black pepper is a flowering vine in the family Piperaceae, cultivated for its fruit, which is usually dried and used as a spice. Hoque *et al.* (2008) reported that, *Cinnamomum verum*, commonly known as cinnamon is a spice obtained from the inner bark of some trees from the genus *Cinnamomum*. Cinnamon has a long history of use in traditional medicine, but there is no evidence for this.

2. Methodology

Collection of Spices

Three spices viz., *Syzygium aromaticum*, *Piper nigrum* and *Cinnamomum verum* were collected from local market of Junnar. These spices were washed twice with tap water to remove dirt followed by double distilled water and then dried in an oven at 50°C for 24 hours. The dried material was then pulverized to form powder, and used for further studies.

Preparation of extracts

Five gram of all the spices powder was extracted in (1:1) acetone : chloroform mixture in soxhelt apparatus for 4 hours and then filtered. The filtrates were concentrated to dryness in rotary evaporator (IKA, RV 10 Control) which were stored at 4°C until further use.

Phytochemical screening

Phytochemical analysis of the test samples was carried out according to standard methods given by Saklani *et al.* 2011, Fransworth *et al.* 1985, Lutterodt *et al.* 1999, Marjorie 1999, Weisser *et al.* 1966 & Ogbulie *et al.* 2007.

3. Result

The result of phytochemical analysis of the spices is presented in table 1. The result reveals that some of the phytochemicals analyzed were present in the extracts of all the spices. Phytosterols, glycosides and terpenoids were present in all the studied spices. Saponins and carbohydrates are present only in *Syzygium aromaticum*, proteins are found only in *Piper nigrum*. Anthocyanins and emodins were absent in the extracts of all the spices. Alkaloids, flavonoids, quinines, phenolic compounds and tannins are present in the extracts of *Syzygium aromaticum* and *Cinnamomum verum* only. Coumerin is absent in the extract of *Syzygium aromaticum* but present in *Piper nigrum* and *Cinnamomum verum*.

Table 1: Screening of spices for phytochemicals

Sr. No.	Parameters	<i>Syzygium aromaticum</i>	<i>Piper nigrum</i>	<i>Cinnamomum verum</i>
1	Phytosterols	+	+	+
2	Saponnins	+	-	-
3	Alkaloids	+	-	+
4	Phenolic compound and Tannins	+	-	+
5	Proteins	-	+	-
6	Glycosides	+	+	+
7	Flavanoids	+	-	+
8	Carbohydrates (by Fehling's)	-	-	-
9	Carbohydrates (by Benedict's)	+	-	-
10	Quinones	+	-	+
11	Coumerin	-	+	+
12	Terpenoids	+	+	+
13	Anthocyanins	-	-	-
14	Emodins	-	-	-

4. Discussion

Spices have been added to foods since ancient times as a flavouring agent, also as folk medicines and food preservatives. Kabic *et al.* (2008) mentioned that presently there is increasing demand in industries and scientific research on spices because of presence of bioactive compounds. According to Okwu (2001), basically when spices are used for medicinal purpose, their value is depend on the phytochemicals they possess. According to Chouhan and Singh (2011), the spices, herbs, plant extract and their phytoconstituents have been reported for anti inflammatory, antidiarrhoeal, antimicrobial, antioxidant and insecticidal activities.

Phytosterols are present in all the extracts of studied spices. Okwu (2001) mentioned that steroids and sterols are of great importance in pharmacy as they possess compounds like sex hormones and can be used for drug production.

Saponins are seem to be non toxic but can show adverse physiological effects, if consumed by animals. Phytochemical analysis of selected spices exhibited the presence of saponins in the extract of *Syzygium aromaticum* only. Akindahunsi and Salawu (2005) reported that, saponins have potential of inhibiting tumor in animals and also used for traditional medicine preparation.

In the present study, the extract of *Syzygium aromaticum* and *Cinnamomum verum*, showed the presence of alkaloids, which are used in allopathic systems. According to Trease & Evans (2005), alkaloid has important biological property like cytotoxicity.

The present investigation also reveals the presence of phenolic compounds and tannins in the extracts of *Syzygium aromaticum* and *Cinnamomum verum*. According to Han *et al.* (2005), phenol and tannins acts as antioxidants. It also has biological property like anti carcinogen, anti inflammation, cardiovascular protection and cell proliferation activities. Nyarko *et al.* (1990), reported that glycosides are useful in lowering blood pressure. They are

also important in the treatment of congestive heart failure and cardiac arrhythmia. In the present investigation, glycosides are present in all the studied spices, which can play important role in synthesis of novel drugs to treat several diseases.

Flavonoids are present only in the extract of *Syzygium aromaticum* and *Cinnamomum verum*. It shows anti allergic, anti inflammatory, anti microbial and anti cancer activity. Proteins and carbohydrates are necessary for the repair and maintaining the animal body. In this work some spices showed the presence of proteins and carbohydrates, therefore nutritional power of these spices as protein and carbohydrate supplements cannot be ignored, which is reported by Vasantha *et al.* (2012).

In the present investigation, spices extracts also showed the presence of quinines, coumarins, and terpenoids. Liu (2011) reported that, quinines showed antitumoral activity which inhibits PGE2 biosynthesis and also cardiovascular disease. Coumarin is used in certain perfumes and fabric conditioners. It also revealed that coumarins have been used for the treatment of asthma and lymphedema. It has been reported that terpenoids are used in the treatment of cough, asthma and hay fever.

5. Conclusion

It has been showed that, the selected spices in this study consist of many useful phytochemicals having important biological properties. It is hoped that the results of this study would lead to find out some compounds which could be used to generate new, more potent antimicrobial drugs with different mechanism of action.

6. Acknowledgements

Deepali D. Kadam is thankful to the Department of Science and Technology (DST), Government of India for funding through DST – INSPIRE Fellowship. The authors are also thankful to the Chairman & Trustees, Junnar Taluka Shivner Shikshan Prasarak Mandal, Junnar and the Offg. Principal, Shri Shiv Chhatrapati College, Junnar for providing the necessary laboratory facilities and continuous encouragement.

References

- [1] Thomas Frederic, Daoust Simon P., and Raymond Michel. Can we understand modern humans without considering pathogens?. *Evolutionary Applications*, 5(4), 368–379, 2012
- [2] Alqareer A., Alyahya A., Andersson L. The effect of clove and benzocaine versus placebo as topical anesthetics. *Journal of dentistry*, 34(10), 747–50, 2012
- [3] Shiva Rani S. K., Neeti Saxena and Udaysree. Antimicrobial Activity of Black Pepper (*Piper nigrum* L.) *Global Journal of Pharmacology*, 7(1), 87-90, 2013
- [4] Mahfuzul Hoque Md., M. L. Bari , Vijay K. Juneja, and Kawamoto S. Antimicrobial Activity of Cloves and Cinnamon Extracts against Food Borne Pathogens and Spoilage bacteria, and Inactivation of *Listeria*

- monocytogenes in Ground Chicken meat with their Essential oils. Rep. Natl. Food Res. Inst, 72, 9–21, 2008
- [5] Saklani S., Gahlot M., Kumar A., Singh R., Patial R., Kashyap P. Antimicrobial activity of extracts of the medicinal plant *Coleus forskohlii*. Int J of Drug Res and Tech, 1(1), 52-59, 2011
- [6] Fransworth N. R., Akerele O., Bingel A. S. Medicinal plants in therapy. Bull World Health Organ, 63, 965-981, 1985
- [7] Lutterodt G. D., Ismail A., Basheer R. H., Baharudin H. M. Antimicrobial effects of *Psidium guajava* extract as one mechanism of its antidiarrhoeal action. Malaysian J Med Sci., 6(2), 17-20, 1999
- [8] Marjorie M. C. Plant products as antimicrobial agents. Clin Microbiol Rev., 12(4), 564-582, 1999
- [9] Weisser R., Asscher A. W., Winpenny J. *In vitro* reversal of antibiotic resistance by DTA. Nature, 219, 1365-1366, 1966
- [10] Ogbulie J. N., Ogueke C. C., Nwanebu F. C. Antibacterial properties of *Uvaria chamae*, *Congronema latifolium*, *Garcinia kola*, *Vernonia amygdalina* and *Aframomium melegueta*. Afr J of Biotech., 6(13), 1549-1553, 2007
- [11] Kabic D., Misan A., Sakac M., Psodorov D. and Milovanovic I. Medical plant extracts as additives in functional bakery food production. Food Processing Quality and Safety, 35 (3), 119-123, 2008
- [12] Okwu D. E. Evaluation of the chemical composition of indigenous Spices and flavoring Agents. Global J. Pure Appl. Sci., 7(3), 455-459, 2001
- [13] Chouhan H. S., Singh S. K. A review of plants of genus *Leucas*. J of Pharmacognosy and Phytotherapy, 3(3), 13-26, 2011
- [14] Okwu D. E. Evaluation of chemical composition of medicinal plants belonging to Euphorbiaceae. Pak Vet J., 14, 160-162, 2001
- [15] Akindahunsi A. A., Salawu S. O. Phytochemical screening and nutrient-antinutrient composition of selected tropical green leafy vegetables. Afr J Biotechnol., 4, 497-501, 2005
- [16] Trease G. E., and Evans M. C. Pharmacognosy 2005. 14th ed, Elsevier, pp 53,431,512.
- [17] Han X., Shen T., Lou H. Dietary polyphenols and their biological significance. Int J Mol Sci., 8(9), 950-988, 2007
- [18] Nyarko A. A., Addy M. E. Effects of aqueous extract of *Adenia cissampeloides* on blood pressure and serum analyte of hypertensive patients. Phytotherapy Res., 4(1), 25-28, 1990
- [19] Vasantha K., Priyavardhini S., Tresina S. P., Mohan V. R. Phytochemical analysis and antibacterial activity of *Kerrostis foetidissima* (JACQ.) COGN. Bioscience Discovery, 3(1), 6-16, 2012
- [20] Liu H. Extraction and Isolation of Compounds from Herbal Medicines in Traditional Herbal Medicine Research Methods, ed. by Willow J. H. Liu 2011 John Wiley and Sons, Inc.