



Research Article

PHYTOCHEMICAL INVESTIGATION OF ETHANOLIC EXTRACT OF *PIPER NIGRUM*, *ZINGIBER OFFICINALE*, AND *ALLIUM SATIVUM* AND SPECTROPHOTOMETRIC DETECTION OF PIPERINE, GINGEROL, AND ALLICIN

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ABSTRACT

Ethanol extract of *Piper nigrum*, *Zingiber officinale* and *Allium sativum* revealed the presence of various phytochemicals constituents; such as Alkaloids, Carbohydrates, glycosides, Tannins, flavones, Saponins etc. Piperine is characterizing compound present in fruits of *Piper nigrum* used as bioavailability enhancer. Gingerol is a measure pungent ingredient of *Zingiber officinale*, also has potent anti-oxidant activity. Allicin is an extract of *Allium sativum* has been presumed to be a very strong anti-oxidant. Present investigations characterized by U.V. vis spectroscopy. The spectrophotometric detection for piperine, gingerol, and allicin is carried out at the absorption maxima of 204 nm, 206 nm and 204 nm respectively.

Keywords: *Piper nigrum*, *Zingiber officinale*, *Allium sativum*, ethanolic extracts, piperine, gingerol, allicin.

INTRODUCTION

In plants the phytochemicals primarily identified and isolated for their therapeutic values are the secondary metabolites such as alkaloid, steroids, tannins, phenols, glycosides, flavones, quinones, pigments etc. that are produced as part of their normal metabolism.¹ The products obtained from plant are relatively impure liquids, semisolids, powders intended only for oral or external use. The extraction procedure for crude drugs is to attain the therapeutically desired portion by treatment with a menstruum. The large amounts of drugs from crude drugs can be extracted with solvent extraction methods i.e. hot continuous soxhlet extraction method. *Piper nigrum* commonly known as black pepper, it belongs to the family piperaceae. The plants are indigenous and cultivated in hot and moist parts of India.² Black pepper is used as spice as well as medicine by itself or as a part of some herbal remedies in combination with other well known herbs and spices.¹ Pungent alkaloid piperine is the main therapeutically active constituents of *piper nigrum*.¹⁰ *Zingiber officinale* is widely used in foods as a spice around the world, and is a common condiment for various food and beverages. It has been used as an important ingredient. Ginger has a long history of medicinal use dating back 2,500 years in China and India for conditions such as headaches, nausea, rheumatism colds nervous diseases asthma stock and diabetes. *Zingiber officinale* contain a number of pungent constituents and active ingredients possesses health promoting properties.^{7,5} Ginger is a widely used herb and food flavoring agent.³ Elements responsible for *Zingiber officinale* spicy flavor have been identified as the gingerols.¹¹ Ginger may be safe and effective for nausea and vomiting during pregnancy when used as recommended doses for short periods of time.⁸ *Allium sativum* is the member of the alliaceae family, has been widely recognized as a valuable spice and a popular remedy for various ailments and physiological disorders. *Allium sativum* used to prevent and treat cardiovascular disease by lowering blood pressure and cholesterol, as an antimicrobial, and as a preventing agent for cancer.⁹ Allicin is the main

biologically active component of freshly crushed *Allium sativum* cloves.⁴

MATERIALS AND METHODS**Materials***Piper nigrum* (Piperaceae)*Zingiber officinale* (Zingiberaceae)*Allium sativum* (Amaryllidaceae)**Methods****Collection**

All the sample *Piper nigrum*, *Zingiber officinale* and *Allium sativum* were purchased from local market of Vidisha region and identification of samples were done by Dr. Sunil Dubey HOD, Department of Botany, St. Mary's P.G. College, Vidisha (M.P.) India.

Extraction

Dry seed of *Piper nigrum* were ground to fine powder by grinder and extracted with 95 % ethanol for 3 h at 45°C. by using Soxhlet method and then add 10 ml Potassium Hydroxide with constant stirring and than filter.¹ The *Zingiber officinale* rhizomes were washed with running tap water than the outer skin of rhizomes were scrapped of by using a knife and than cut into tiny pieces. All the sample we prepared were than dried in Hot Air Oven and ground into a fine powder by using a grinder and extracted with 95 % ethanol for 12 hrs by Soxhlet method and than filter.¹² Papery skin of *Allium sativum* bulb were removed and cut into tinny pieces and dried by hot air oven than ground into a fine powder with the help of grinder and extracted with 95 % ethanol for 12 h by soxhlet method.

Phytochemical Evaluation

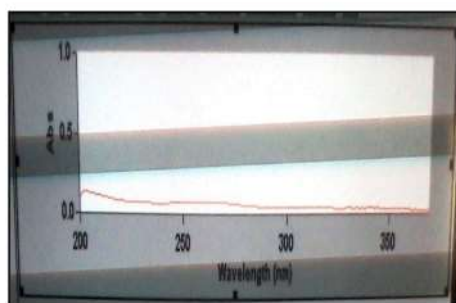
Phytochemical test shows the presence of glycosides, carbohydrates, flavones, saponins, tannins, alkaloids and Oil etc.

Table 1: Organoleptic and physical evaluation of *Piper nigrum*, *Zingiber officinale* and *Allium sativum*

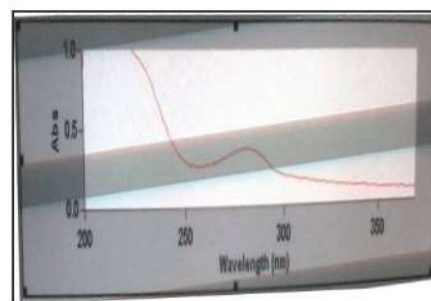
S. No.	Phytochemical test	<i>Piper nigrum</i>	<i>Zingiber officinale</i>	<i>Allium sativum</i>
1	Glycosides	+	+	-
2	Carbohydrates	+	+	-
3	Flavones	+	+	+
4	Saponins	+	+	+
5	Tannins	+	+	+
6	Alkaloids	+	+	-
7	Oils	+	+	+

Table 2: Result Showing Phyto-chemical Analysis of crude extracts of *Piper nigrum*, *Zingiber officinale* and *Allium sativum*

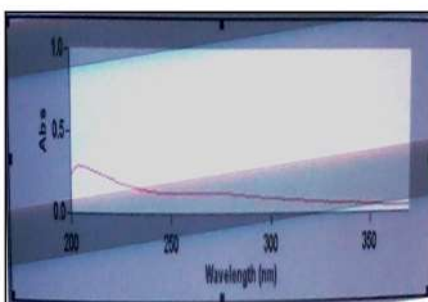
S. No.	Test	Result		
		<i>Piper nigrum</i>	<i>Zingiber officinale</i>	<i>Allium sativum</i>
1.	Color	Black	Yellowish brown	Yellowish brown
2.	Odor	Aromatic	Aromatic	Aliphatic
3.	Taste	Aromatic and Pungent	Aromatic and Pungent	Pungent
4.	Moisture	11.0 %	8.0 %	11.0 %
5.	Ash content	7.5 %	3.5 %	4.0 %
6.	Acid insoluble Ash	3.3 %	3.7 %	5.5 %
7.	Water soluble Ash	16.66 %	16.66 %	10.0 %


Figure 1: U. V. images of *Piper nigrum*

$\lambda = 204 \text{ nm.}$
Abs. = 0.1392


Figure 2: U.V. images of *Zingiber officinale*

$\lambda = 206 \text{ nm.}$
Abs. = 1.7639



$\lambda = 204 \text{ nm.}$
Abs. = 0.2966

Figure 3: U. V. images of *Allium sativum*

Test for Glycosides**Sulfuric Acid test**

Take 1 ml of extract few drops of conc. Sulfuric Acid was added and mixed well. The content were allowed to stand for few minutes, appearance of reddish precipitate indicated the presence of glycosides.

Test for Carbohydrates Molisch's test

To 1 ml of extract 2 ml of Molisch's reagent was added and mixed well. To the mixture 2 ml of conc. Sulfuric acid was added along the side of test tube and allowed to stand for few minutes. Appearance of reddish-violet ring at the junction of two liquids indicated the presence of carbohydrates.

Test for Flavones**Aqueous test**

Appearance of yellow color on treating 1 ml of test substance with equal quantity of aqueous NaOH indicates the presence of flavones.

Test for Saponins**Aqueous test**

To 1 ml of substance, 5 ml of water was added and the tube was shaken vigorously. Lather formation indicated the presence of saponins.

Test for Tannins**Ferric chloride test**

To 1 ml of test samples, equal amount of ferric chloride was added. The presence of tannins was indicated by the formation of greenish black color.

Test for Alkaloids**Wagner's test**

To 1 ml of extract was added to 2 ml of wagner's reagent. Development of reddish-brown precipitate revealed the presence of alkaloids.

Test for Oils**Spot test**

Small quantity of test substance was pressed with Whatmann filter paper. Appearance of oil stains indicated the presence of oil.¹

Qualitative Profile

The qualitative analysis is carried out by U.V. Spectroscopy. It is a suitable method to show the qualitative profile of Piperine, gingerol, and allicin in the ethanolic extracts.

Detection of Piperine, Allicin and Gingerol by UV-spectroscopy

For stock solution, pipette out 2 ml. of filtered of *Piper nigrum*, *Zingiber officinale* and *Allium sativum* extracts and dilute to 25 ml. by ethanol. From this stock solution pipette out 1 ml. and dilute to 25 ml, further dilute this solution to 50 ml.⁶

RESULT AND DISCUSSION

The characterization of the isolated piperine, gingerol, and allicin was done by U.V. Spectroscopy. The U.V. absorption maxima of isolated compounds piperine, gingerol, and allicin were recorded using ethanol as a solvent. U.V. Spectra of the isolated compound show peaks of almost same intensity, piperine at 204 nm, gingerol at 206 nm and allicin at 204 nm. To determine the presence of various elements qualitative experiments were performed. The observed data for piperine, gingerol, and allicin was found to match well with that of standard data.

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