Available online on 25.12.2017 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

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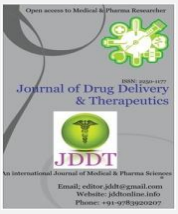

Open Access Research Article

PRELIMINARY PHYTOCHEMICAL AND DIURETIC SCREENING OF ETHANOLIC AND AQUEOUS EXTRACT OF *ZINGIBER OFFICINALE*

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ABSTRACT

The present study was to evaluate Diuretic activity of ethanolic and aqueous extracts of *Zingiber officinale* Rhizome in wistar rats. Ethanolic and aqueous extracts were administered to experimental rats orally at the doses of 500 mg/kg p.o. Furosemide (5 mg/kg) was used as positive control in the study. The diuretic effect of the extract was evaluated by measuring urine volume & sodium content. Urine volume was significantly increased by ethanolic extract in comparison to the aqueous and control group, while the excretion of sodium was also increased by extract. The ethanolic extract had the additional advantage over aqueous extract. We can conclude that ethanolic extract of *Zingiber officinale* produced notable diuretic effect which appeared to be comparable to that produced by the reference diuretic furosemide.

Cite this article as: Badore M, Mahajan P, Das P, Badore N, Pillai S, Preliminary phytochemical and diuretic screening of ethanolic and aqueous extract of Zingiber officinale, Journal of Drug Delivery and Therapeutics. 2017; 7(7):170-172

INTRODUCTION:

Diuretics, also called water pills, are medications designed to increase the amount of water and salt expelled from the body as urine. There are three types of prescription diuretics. They're often prescribed to help treat high blood pressure. The drugs reduce the amount of fluid in your blood vessels, and this helps lower your blood pressure. Other conditions are also treated with diuretics. Congestive heart failure, for instance, keeps your heart from pumping blood effectively throughout your body. This leads to a buildup of fluids in your body, which is called edema. Diuretics can help reduce this fluid buildup. Ginger (*Zingiber officinale*) is one of the most widely used natural products consumed as a spice and medicine for treating nausea, dysentery, heartburn, flatulence, diarrhea, loss of appetite, infections, cough, and bronchitis. Ginger (*Zingiber officinale*), a member of the Zingiberaceae family, is a popular spice used globally especially in most of the Asian countries. Chemical analysis of ginger shows that it contains over 400 different compounds. The major constituents in ginger rhizomes are carbohydrates (50–70%), lipids (3–8%), terpenes, and phenolic compounds. Terpene components of ginger include zingiberene, β-bisabolene, α-farnesene, β-sesquiphellandrene, and α-curcumene, while phenolic compounds include gingerol, paradols, and shogaol. These gingerols (23–25%) and shogaol (18–25%) are found in higher quantity than others. Besides these, amino acids, raw fiber, ash, protein, phytosterols, vitamins (e.g., nicotinic acid and vitamin A), and minerals are also present. The aromatic constituents include zingiberene and bisabolene, while the pungent constituents are known as gingerols and shogaols. Other gingerol- or shogaol-related compounds (1–10%), which have been reported in ginger rhizome, include 6-paradol, 1-dehydrogingerdione, 6-gingerdione and 10-gingerdione, 4- gingerdiol, 6-gingerdiol, 8-gingerdiol, and 10-gingerdiol, and diarylheptanoids. The characteristic odor and flavor of ginger are due to a mixture of volatile oils like shogaols and gingerols. Ginger has been used as a spice as well as medicine in India and China since ancient times. It was also known in Europe from the 9th century and in England from the 10th century for its medicinal properties. Native Americans have also used wild ginger rhizome to regulate menstruation and heartbeat. Ginger is thought to act directly on the gastrointestinal system to reduce nausea. Therefore, it is used to prevent nausea resulting from chemotherapy, motion sickness, and surgery. Ginger is known as a popular remedy for nausea during pregnancy. Ginger is also used to treat various types of other GI problems like morning sickness, colic, upset stomach, gas, bloating, heartburn, flatulence, diarrhea, loss of appetite, and dyspepsia (discomfort after eating). According to Indian Ayurvedic medicinal system, ginger is recommended to enhance the digestion of food.

Besides these, ginger has been reported as a pain relief for arthritis, muscle soreness, chest pain, low back pain, stomach pain, and menstrual pain. It can be used for

treating upper respiratory tract infections, cough, and bronchitis. As an anti-inflammatory agent, it is recommended for joint problems. Fresh juice of ginger has been shown to treat skin burns. Active component of ginger is used as a laxative and antacid medication. It is also used to warm the body for boosting the circulation and lowering high blood pressure. Because of its warming effect, ginger acts as antiviral for treatment of cold and flu. Ginger is also used as a flavoring agent in foods and beverages and as a fragrance in soaps and cosmetics. The present study was therefore aimed to explore the preliminary phytochemical screening and diuretic effects of ethanolic and aqueous extract of *Zingiber officinale* Rhizome[1].

MATERIAL AND METHODS:

The Rhizome of *Zingiber officinale* was collected from local market and was authenticated by Dr. S. K. Mahajan, M. Sc, Ph. D, department of botany, Govt. P. G. Collage, Khargone, M. P. India and It has been identified and deposited.

Extract preparation

The Rhizome of *Zingiber officinale* were coarsely powdered and 1 kg of this powered plant material was extracted with the help of the soxhlet apparatus using ethanol as a solvent. The solvent from the ethanolic extract was removed under vacuum distillation; dried material was kept in a desiccators. Then the dried marc was again extracted with water.

Preliminary Phytochemical analysis

Zinger was analyzed for the various classes of phytoconstituents such as flavonoids, phenolic acids, anthocyanins, quinones, alkaloids, tannins, and saponins using standard phytochemical methods. Phytochemical tests were carried out following Shah and Quadry and Kokate[2].

Experimental animals

Male Wistar albino rats of body weight 150-200 g were obtained from the Institute Animal House. The rats were acclimatized in the department animal house at an ambient temperature of 25°C, under a 12hour dark -12 hour light, cycle, for the whole period of the study. The animals were fed with a standard pellet diet and water *ad libitum.* The experiment was carried out according to the guidelines of the Committee for the Purpose of Control and Supervision of Experimental on Animals, New Delhi, India and the research protocol was approved by the Institute animal ethical committee (1151/ac/07/CPCSEA).

Experimental protocol [3,4]

Diuretic activity was determined by the following methods of Kau *et al.*, with minor modifications. The rats were randomly divided into four groups of six animals each as follows: (1) Control – given 25 ml/kg body weight of normal saline; (2) Furosemide (5 mg/kg) + normal saline (25 ml/kg) of body weight; (3) Ethanolic extract (500mg/kg) + normal saline (25 ml/kg) of body weight; (4) Aqueous extract (500mg/kg) + normal saline (25 ml/kg) of body weight. The animals were fasted overnight (18 h) prior to the test but with free access to tap water only and then were given an oral loading of normal saline (0.9%) of 0.05 ml per g body weight. Immediately after administration, the rats were paired and placed in metabolism cages. Urine was collected in a graduated cylinder and its volume was recorded at 1 h intervals for 8 h. Cumulative urine excretion was calculated in relation to body weight and expressed as ml/100 g b.w. Electrolyte (Na) concentrations estimated from the urine sample.

Measurement of Urine Output and Analysis of Electrolytes. Na concentrations were measured using digital flame photometer. The instrument was calibrated with standard solutions containing different concentrations of Na+.

Statistical Analysis. The results are expressed as mean values ± SD for pairs of rats. Statistical comparison was carried out by analysis of variance (ANOVA).

RESULTS AND DISCUSSION:

Phytochemical Investigation

The result of phytochemical screening showed the presence of Alkaloids, Carbohydrates, Tannins, Volatile oil, saponins, Glycosides, Triterpenes, flavonoids.

Acute toxicity test

From the acute toxicity test we found the dose of 500mg/kg of both ethanolic and aqueous extract found safe dose for screening method.

Pharmacological estimation

The results of the evaluations carried out on the extracts are listed in Table 1 and Table 2. Table 2 shows the urinary volume (ml/100g/8h) while Table 1 shows the electrolyte (Na+) content (mequiv/100g/8h) of the urine of the animals.

Urine volume. Table 1 shows that the reference diuretic, furosemide, increased urine volume. The extracts were also showed their efficiency in comparison to standard. For the ethanolic extract, doses of 500 mg/kg body weight showed more potent effect than the aqueous group. Ethanolic extract of *Zingiber officinale* shows significance increase in urine excretion. Thus, the diuretic effect of extract indicates an increase in both water excretion and excretion of sodium. Ethanolic extract (500 mg/kg) shows a significant result in excretion of water & sodium, which proves as a strong diuretic agent in compared to aqueous extract.

Table 1: Effect of oral administration of *Z officinale* and furosemide on sodium excretion

Treatment	Dose	Sodium (meq/100g/8 hr) $\times 10^{-2}$
Control (Normal Saline)	25 ml/kg	36.12
Standard (Furosemide)	5 mg/kg	92.50
Ethanolic Extract	500mg/kg	75.83
Aqueous Extract	500mg/kg	62.36

Table 2: Effect of oral administration of *Zingiber officinale* and furosemide on urine volume

Treatment	Dose	Urine volume							
		1hr	2hr	3hr	4hr	5hr	6hr	7hr	8hr
Control (Normal Saline)	25 ml/kg	0.33 ± 0.51	0.5 ± 0.54	0.83 ± 0.40	1.0 ± 0.0	1.3 ± 0.51	1.83 ± 0.40	1.83 ± 0.40	2.0 ± 0.0
Standard (Furosemide)	5 mg/kg	1.0± 0.89	1.6± 0.51	2.5± 0.54	2.6± 0.51	3.16± 0.78	3.83± 0.40	4.5± 0.54	5.33± 0.81
Ethanolic Extract	500mg/kg	0.3± 0.51	0.6± 0.51	1.16± 0.75	1.8± 0.7	2.3± 0.8	3.0± 0.89	3.6± 0.81	4.16± 0.98
Aqueous Extract	500mg/kg	0.16± 0.40	0.6± 0.5	1.3± 0.51	1.5± 0.54	2.16± 0.40	2.5± 0.54	3.3± 0.51	3.83± 0.75

Values are mean as ± SD

CONCLUSION:

The results obtained in this study provide a quantitative basis to explain the traditional use of *Zingiber officinale* as a diuretic agent.

Acknowledgement: The authors are thankful to Mr. Prabhat Das, Mr. Narendra Badore and Dr. sujit Pillai for their support in providing research facility.

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