Asian Journal of Pharmaceutical Education and Research
Vol -8, Issue-1, January-March 2019
ISSN:2278 7496

RESEARCH ARTICLE Impact Factor: 7.014

EVALUATION OF PHYTOCHEMICAL AND ANTIULCER ACTIVITY OF *CORIANDRUM SATIVUM L.*

Salaj Khare*, Amit Jain, Deepika prajapati

Technocrats Institute of Technology-Pharmacy Education and Research, Bhopal (M.P.)

*Corresponding Author's E mail: salaj822222@gmail.com

Received 20 Nov. 2018; Revised 28 Nov. 2018; Accepted 17 Dec. 201, Available online15 Jan. 2019.

ABSTRACT

Coriandrum Sativum family Umbelliferae is relatively reputed ayurvedic medicinal tree. The literature related to the study reveals that although exhaustive work was carried out on umbelliferone. The work has carried mainly on hepato-protective, antioxidant, and antidiabetic activity. But not much work carried on the umbelliferone for anti-ulcer. The objective of the present study is to analyze the effect of umbelliferone on ulcer induced rats by using pylorus ligation induced ulcer. The extract was evaluated for their anti-ulcer activity in Pylorus ligation induced ulcer model in male wistar rats. The significant increase in the antiulcer activity of *Coriandrum sativum* can be attributed to the presence of flavanoids, alkaloids and Phenols compounds. Flavanoids are among the cytoprotective materials for which antiulcerogenic efficacy has been broadly confirmed. It is suggested that, these active compounds would be able to stimulate mucus, bicarbonate and the prostaglandin secretion and counteract with the deteriorating effects of reactive oxidants in gastrointestinal lumen. So the antiulcer activity of *Coriandrum sativum* can be attributed to its flavanoids content material.

K**eywords:** Antiulcer activity, gastric ulceration, umbelliferone, *coriandrum sativum*, cytoprotective

INTRODUCTION:

Peptic ulcer disease (PUD) is one of the most common gastrointestinal disorders, which causes a high rate of morbidity. It comprises both gastric and duodenal ulcers. The therapy of peptic ulcer involves decreasing the secretion of acid with H2 -receptor antagonist or proton pump inhibitor, neutralizing secreted acid with antacids and enhancing the mucosal protection mechanism by cytoprotective agents. Although these drugs have brought about remarkable changes in ulcer therapy but efficacy and safety of these drugs are still debatable. Reports on clinical evaluation of these drugs show that there are incidences of relapses, adverse effects and danger of drug interactions during ulcer therapy. In recent times, focus on plant research has increased all over the world and a large body of evidence has been collected to show immense potential of medicinal plants used in various traditional systems. Most of the herbal drugs used in the management of peptic ulcer have been reported to reduce the offensive factors, they have been proved to be safe and effective and showed better patient tolerance. Hence, use of natural drugs alone or in combination with other drugs should be seriously considered in the management of PUD. Since time immemorial, herbs including spices have been used in traditional medicine to treat a wide

range of ailments, including gastrointestinal disorders such as dyspepsia, gastritis and peptic ulcer disease[1].

A large number of spices, namely large cardamom, black pepper, caraway, coriander, clove, ginger, saffron, turmeric has been shown to possess significant gastro protective activities. Other properties attributed to spices such as anti-oxidant, anti-spasmodic, carminative, anti-inflammatory and other related effects further compliment their use in the management of PUD [2].

Coriandrum Sativum family Umbelliferae is highly reputed ayurvedic medicinal tree commonly known as the Dhanyaka. It is small sized tree growing throughout India, Italy. Netherlands, Central and Eastern Europe, China and Bangladesh. The different parts of this plant contain monoterpenes, α-pinene, limpnene, γ-terpinene, p-cymene, borneol, citronellol, camphor, geraniol, coriandrin, dihydrocoriandrin, coriandronsA-E, flavonoids and essential oils. Various parts of this plant such as seed, leaves, flower and fruit, possess Diuretic, Antioxidant Activity, Ant-diabetic Anti-convulsant activity, Sedative Hypnotic Activity, Anti-microbial Activity, Anti mutagenic, Anthelmintic activity [3].

The phytochemical screening of *Coriandrum sativum* showed that it contained essential oil, tannins, terpenoids, reducing sugars, alkaloids, phenolics, flavonoids, fatty acids, sterols and glycosides. It also contained high nutritional values including proteins, oils, carbohydrates, fibers and wide range of minerals, trace elements and vitamins. The previous pharmacological studies revealed that it possessed anxiolytic, antidepressant, sedative-hypnotic, anticonvulsant, memory enhancement, improvement of orofacial dyskinesia, neuroprotective, antibacterial, antifungal, anthelmintic, insecticidal, antioxidant, cardiovascular, hypolipidemic, anti-inflammatory, analgesic, antidiabetic, mutagenic, antimutagenic, anticancer, gastrointestinal, deodorizing, dermatological, diuretic, reproductive, hepatoprotective, detoxification and many other pharmacological effects [4].

Essential oil of coriander was analyzed by GC/MS and its chemical compositions were identified. Camphor (44.99%), cyclohexanol acetate (cis-2-tert.butyl-) (14.45%), limonene (7.17%), α-pinene (6.37%), were the main components of coriander essential oil (CEO). Then, antioxidant and antifungal activities of CEO were evaluated in cake during 60 day storage at room temperature. The results indicated that, CEO at 0.05, 0.10 and 0.15% inhibited the rate of primary and secondary oxidation products formation in cake and their effects were almost equal to BHA at 0.02 % ($p<0.01$). Antioxidant effects of this essential oil may be due to its trepene and terpenoid components. CEO at 0.15 % could inhibit the

growth of fungal in the cake. Organoleptic evaluation of cakes containing CEO at 0.05 % was not different from the control ($p<0.01$). Results showed that this essential oil could be used as natural antioxidant and antifungal in foodstuffs especially those lipid containing [5].

Tukhm Kishneez (*Coriandrum sativum* Linn.) in Unani literature is mentioned for its anti-gastritis and anti-ulcer activity and also for its sedative, hypnotic, anti-anxiety and anti-stress activity. It has been studied scientifically for anti-ulcer activity on certain parameters. The effect of hydro alcoholic extract of test drug was studied in healthy adult Wistar rats of either sex; Ulcer was induced by Cold and Restraint method. The results of this study showed that reduction in the ulcer score was found more in Post-treated animals ($p < 0.01$) than in Pre-treated ($p < 0.05$) animals and the significant decrease in ulcer index in Post-treated animals further demonstrated that curative effect of the test drug is more remarkable than protective effect. The test drug also showed dose dependent effect as indicated by ulcer scores and ulcer indexes in different groups at two different dose levels. Histological findings were in agreement with the ulcer index and ulcer score in all the groups. The study demonstrated that Tukhm Kishneez possessed significant anti-ulcer effect [1].

MATERIALS AND METHODS

Aerial part of *Coriandrum sativum* L. are quite evident from the literatures surveyed that these plants possess antibacterial, and antioxidant activity and therefore the extracts of these herbs alone or in combination may have the potential to treat many diseases in an effective manner without exhibiting side effect or toxicity as indicated by synthetic molecules. The aim of our study is to provide scientific evidence concerned to the medicinal values of this herb. Physicochemical investigations were performed on the various extracts of these plants using systemic as follows:

Plant material

Aerial part of *Coriandrum sativum* L. was collected from ruler area of Bhopal (M.P), India in the months of October 2017.

Organoleptic characters

Dried Plant materials were crushed in pastle and mortar to obtain a powdered form and then subsequent used for organoleptic characters. A small amount of powdered drug was spread on a white tile and physically examined for general appearance i.e. color, taste, texture etc. The powders have shown the following result:

Table No. 6.1: Organoleptic Characters of Chosen Drugs

Plant	Color	Odour	Taste	Texture
***Coriandrum sativum* L.**	Dark green	Characteristic	Characteristic	Greenish and foliaceous

Extraction procedure [6]

Following procedure was adopted for the preparation of various extracts from the shade dried and powdered herbs*:*

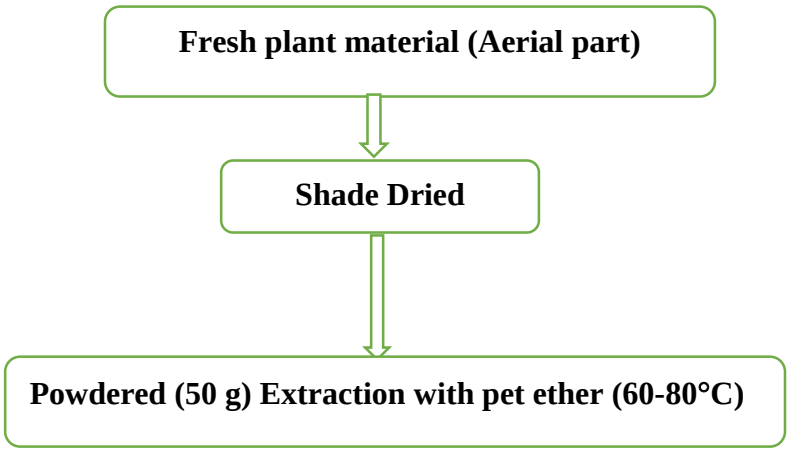
Defatting of Plant Material

Powdered plant material of *Coriandrum sativum* L. were shade dried at room temperature. The shade dried plant material was coarsely powdered and subjected to extraction with petroleum ether (60-80°C) in a soxhlet apparatus. The extraction was continued till the defatting of the material had taken place.

Extraction by hot continuous percolation process

50g. of *Coriandrum sativum* L. dried plant material were exhaustively extracted with various solvent (Pet ether, Chloroform, Ethyl Acetate, methanol and water). The extracts were evaporated above their boiling points. Finally, the percentage yields were calculated of the dried extracts.

Flow chart of extraction method



Determination of Percentage yield

Calculation of percentage yield

The percentage yield of yield of each extract was calculated by using formula:

$$\text{Percentage yield} = \frac{\text{Weight of extract}}{\text{Weight of powdered drug taken}} \times 100$$

Qualitative phytochemical tests [7-8]

The extracts obtained by solvent extraction were subjected to various qualitative tests to detect the presence of plant constituents. The extracts were subjected to various qualitative tests to detect the presence of plant constituents. The results have been shown in table.

Total Phenolic content estimation

The total phenolic content of the extract was determined by the modified Folin-Ciocalteu method [9]. 10 mg Gallic acid was dissolved in 10 ml methanol, various aliquots of 5- 25µg/ml was prepared in methanol. 10 mg of dried extracted dissolve in 10 ml methanol and filter. Two ml (1mg/ml) of this extract was for the estimation of phenols. 2 ml of extract or standard was mixed with 1 ml of Folin-Ciocalteu reagent (previously diluted with distilled water 1:10 v/v) and 1 ml (75g/l) of sodium carbonate. The mixture was vortexed for 15s and allowed to stand for 15min for colour development. The absorbance was measured at 765 nm using a spectrophotometer.

Total flavonoid content estimation

Total flavonoids content was determined based on aluminium chloride method. 10 mg quercetin was dissolved in 10 ml methanol, and various aliquots of 5- 25µg/ml were prepared in methanol. 10 mg of dried extracted dissolve in 10 ml methanol and filter. Three ml (1mg/ml) of this extract was for the estimation of flavonoid. 1 ml of 2% $AlCl_3$ methanolic solution was added to 3 ml of extract or standard and allowed to stand for 15 min at room temperature; absorbance was measured at 420 nm.

***In-Vitro* free radical scavenging activity (2, 2-diphenyl-1-picrylhydrazyl - DPPH):** [10]

It is a **s**table free radical by virtue of the delocalisation of the spare electron over the molecule as a whole, so that the molecules do not dimerise. When a solution of DPPH is mixed with that of a substance that can donate a hydrogen atom, then this gives rise to the reduced form with the loss of this violet color. DPPH scavenging activity was measured by the spectrophotometer. Stock solution (1.5 mg/ml in methanol) was prepared such that 75 µl of it in 3 ml of methanol gave an initial absorbance of 2.706. Decrease in the absorbance in presence of sample extract at different concentration (10- 100 µg/ml) was noted after 15 minutes.

Anti ulcer activity [11]

Animals: -

Wistar rats (150–200 g) were group housed (n= 6) under a standard 12 h light/dark cycle and controlled conditions of temperature and humidity (25±2 °C, 55–65%). Rats received standard rodent chow and water *ad libitum*. Rats were acclimatized to laboratory conditions for 7 days before carrying out the experiments. All the experiments were carried in a noise-free room between 08.00 to 15.00 h. Separate group (n=6) of rats was used for each set of experiments. The animal studies were approved by the Institutional Animal Ethics Committee (IAEC), constituted for the purpose of control and supervision of experimental animals by Ministry of Environment and Forests, Government of India, New Delhi, India.

Pyloric ligation induced gastric ulceration [12]

Albino rats of either sex were divided into two groups of six animals each. Animals were fasted for 24 h before the study, but had free access to water. Extract at 100 and 200 mg/kg, (p. o.) were given to the animals in the treatment group. After 1h of drugs treatment, they were anaesthetized with the help of anesthetic ether; the abdomen was opened by a small midline incision below the xiphoid process. Pyloric portion of the stomach was slightly lifted out and ligated according to method of Shay et al., avoiding traction to the pylorus or damage to its blood supply.

The stomach was replaced carefully and the abdominal wall was closed by interrupted sutures. Rats were sacrificed by an over dose of anaesthetic ether after four hours of pyloric ligation. The abdomen was opened, cardiac end of the stomach was dissected out and the contents were drained into a glass tube. The volume of the gastric juice was measured and centrifuged at 2000 rpm for 10 min. From the supernatant, aliquots (1 ml of each) were taken for the determination of pH, total and free acidity. Each stomach was examined for lesions in the fore stomach portion and indexed according to severity.

Macroscopic evaluation

Scoring of ulcer

0 = Normal colored stomach

0.5 = Red coloration

1 = Spot ulcer

1.5 = Hemorrhagic streaks

2 = Ulcers ≥ 3 but ≤ 5

3 = Ulcers >5

Calculation of ulcer Index

UI = (UN + US + UP) x 10-1

UI = Ulcer Index

UN = Average of number of ulcer per animal

US = Average of severity score

UP = Percentage of animal with ulcer

Parameters evaluated from gastric juice

A) Volume of gastric juice: The volume of the centrifuged sample was expressed as ml/ 100 g body weight.

B) pH of gastric juice: (11) pH of gastric juice was measured with the help of pH meter.

C) Total Acidity and Free Acidity: (11) It is based on simple acid-base titration.

Reagents: 1. 0.01N NAOH, 2. Phenolphthalein (1%):

Procedure: Gastric juice (1ml) was pipette into a 100ml conical flask and diluted with 9ml distilled water. Two or three drops of Toepfer's reagent was then added and titrated with 0.01 N sodium hydroxide until all traces of red colour disappeared and the colour of the solution was yellowish orange. The volume of alkali added was noted. This volume corresponds to free acidity. Two or three drops of phenolphthalein were then added and the titration was continued until a definite red ting appeared; the volume of alkali added was noted. The volume corresponds to total acidity. Acidity was expressed in terms of mEq/L.
The total acidity is expressed as mEq/L by the following formula:

$$\textbf{Acidity} = \textbf{Vol. of NaOH} \times \textbf{N} \times 100 / 0.1$$

RESULTS

Result of Percentage Yield of Different Extract

The yield of extracts obtained from different samples using different solvents are depicted in the table no.1.

Table No. 1: Result of Percentage Yield of Different Extract of *Coriandrum sativum* L.

S. No.	Solvents	Percentage Yield (%)
1.	Pet. Ether	1.25
2.	Chloroform	3.25
3.	Ethyl Acetate	4.58
5.	Ethanol	8.20
6.	Water	8.56

Results of phytochemical Testing

The outcomes of the results are discussed separately in the table no. 2.

Table No. 2: Result of Phytochemical Screening of *Coriandrum sativum* L. Extracts

S.No.	Constituents	A	B	C	D	E
1.	Alkaloids	-	-	-	-	-
2.	Glycosides	-	-	-	-	-
3.	Flavonoids	-	+	+	+	+
4.	Diterpenes	+	-	+	+	-
5.	Phenolics	-	-	+	+	+
6.	Amino Acids	-	-	+	+	+
7.	Carbohydrate	-	-	-	-	-
8.	Proteins	-	-	+	+	+
9.	Saponins	-	-	-	+	+
10.	Oils and fats	+	-	-	-	-

A- Pet. Ether, B- Chloroform, C- Ethyl acetate, D- Methanol, E- Water

From the results obtained it is clear that the *Coriandrum sativum* L. plant shows the presence of saponins, flavonoids, Proteins, Amino Acids, Phenolics, Diterpenes amino acid were found present in aerial part when extracted with different solvents using soxhlet extraction procedure. The phytochemical analysis of *Coriandrum sativum* L. plant indicates the presence of phenols and flavonoids present in sufficiently

enough quantity according to preliminary phytochemical analysis. Phenolic and Flavonoids are the phytochemicals that are present in ethyl acetate, methanol and water.

Results of Estimation of Total Phenolic and flavanoid content estimation

Total Phenolic content estimation (TPC)

The content of total phenolic compounds (TPC) content was expressed as mg/100mg of gallic acid equivalent of dry extract sample using the equation obtained from the calibration curve: **Y = 0.042X+0.002, R^2= 0.999,** where X is the gallic acid equivalent (GAE) and Y is the absorbance.

Calibration Curve of Gallic acid

Table No. 3: Preparation of calibration curve of Gallic acid

S. No.	Concentration	Absorbance
0	0	0
1	5	0.194
2	10	0.422
3	15	0.637
4	20	0.848
5	25	1.035

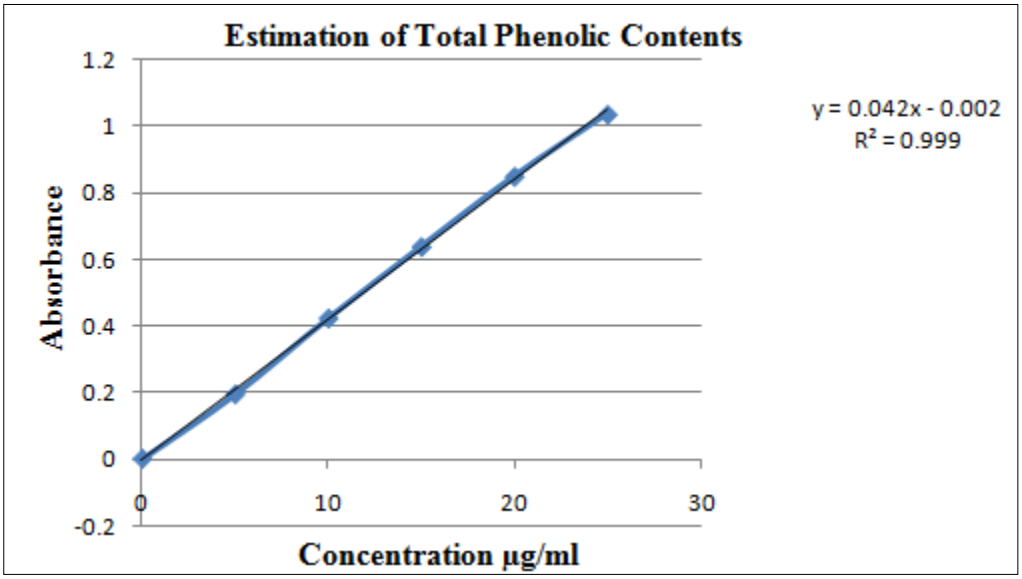


Figure 2: Graph of Estimation of Total Phenolic content

Total flavanoid content estimation (TFC)

The content of total flavanoid compounds (TFC) content was expressed as mg/100mg of quercetin equivalent of dry extract sample using the equation obtained from the calibration curve: **Y = 0.06X+0.019, R^2= 0.999,** where X is the quercetin equivalent (QE) and Y is the absorbance.

Calibration Curve of Quarcetin

Table No. 4: Preparation of calibration curve of Quarcetin

S. No.	Concentration	Absorbance
0	0	0
1	5	0.352
2	10	0.61
3	15	0.917
4	20	1.215
5	25	1.521

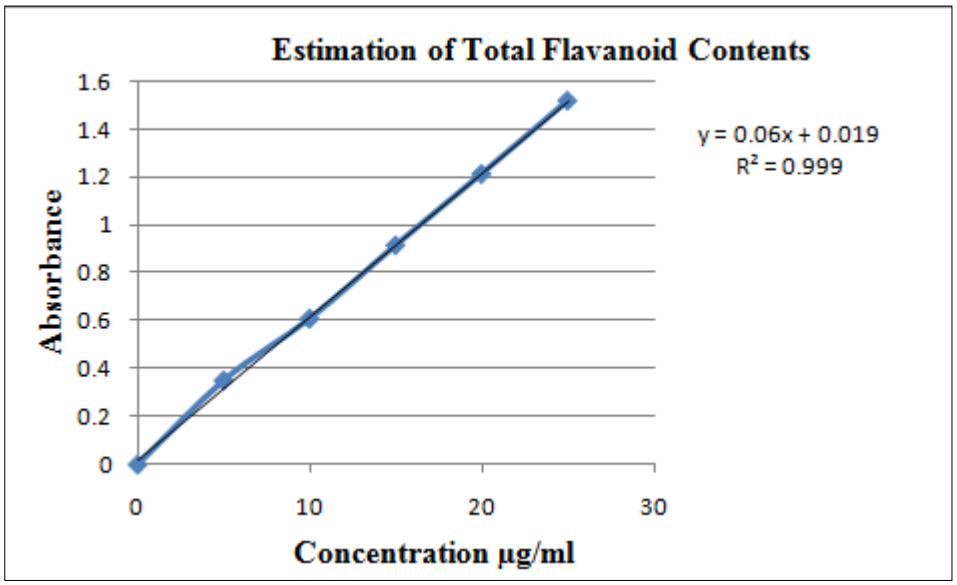


Figure 3: Graph of Estimation of Total flavanoid content

Table No. 5: Total Phenolic and Total flavanoid content

S. No.		*Coriandrum sativum* L.			
	Solvents→	**Chloroform**	**Ethyl acetate**	**Methanol**	**Water**
1.	**Total Phenol (GAE) (mg/100mg)**	-	0.547	1.911	1.483
2.	**Total flavanoid (QE) (mg/100mg)**	0.333	0.656	1.270	1.103

Result *in vitro* free radical scavenging activity (2, 2-diphenyl-1-picrylhydrazyl - DPPH)

Table No. 6: Result of *in vitro* free radical scavenging activity

S. No	Vitamin C			*Coriandrum sativum* L.		
	Conc.	Test	% Inhibition	Conc.	Test	% Inhibition
1	10	1.524	34.92293	10	1.447	23.45857
2	20	1.012	52.55299	20	1.421	39.49904
3	40	0.655	58.33333	40	1.375	54.04624
4	60	0.322	73.31407	60	1.322	68.30443
5	80	0.268	84.34489	80	1.285	70.52023
6	100	0.236	88.63198	100	1.242	74.85549
IC_{50} (µg/ml)			24.18	**IC_{50}**		46.04

Absorbance of 0.1mM DPPH (Ao) = 2.076

Anti Oxidant activity of Plant extract (DPPH Method) percentage Inhibition Vs Concentration

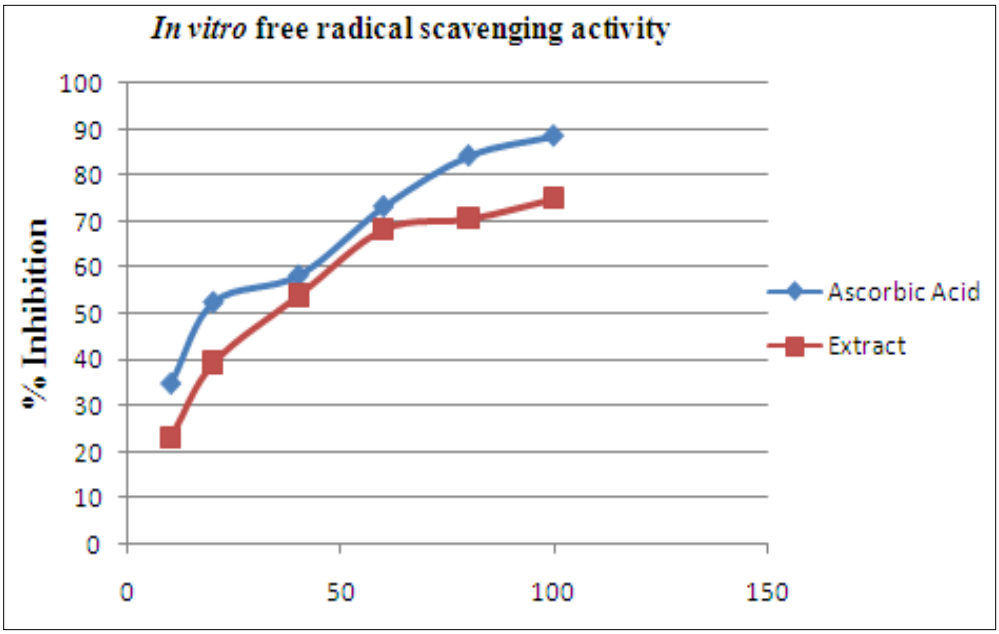


Figure 4: Graph of *in vitro* free radical scavenging activity

DPPH scavenging activity has been used by various researchers as a rapid, easy and reliable parameter for screening the in vitro antioxidant activity of plant extracts. DPPH is a stable free radical and accepts an electron to become a stable diamagnetic molecule. The absorption maximum of a stable DPPH radical in methanol was at 517nm. It was observed that with the increase of concentration, there is decrease of absorbance value. The decrease in absorbance of DPPH radical caused by antioxidants, because of the reaction between antioxidants molecules and radical, progresses, which results in the scavenging of the radical by electron donation. IC_{50} for standard ascorbic acid was found to be 24.18 µg/ml and for methanolic extract of *Coriandrum sativum* L. was found to be 46.04µg/ml. Thus the anti-oxidant activity of sample was less than the standard table 7.6.

Free radicals are the cause for several major disorders. So, evaluation of antioxidant activity in plants could result in the discovery of natural antioxidants with pharmacological and food value. The importance of phenol compounds in plants as natural antioxidants and their use as substitutes to synthetic antioxidants in food additives is well known. Therefore there observation can be used in pharmaceutical to explore new drugs. Thus the present aim is to assess the antioxidant activity of *Coriandrum sativum* L. by DPPH method and also compared the % antioxidant activity with standard ascorbic acid.

The DPPH free radical scavenging activity of the methanolic extract of the plant material of *Coriandrum sativum* L. In our experiment ascorbic acid which was taken as standard. For all samples the assay were carried out in triplicate.

Results of anti ulcer activity

Results of Pyloric ligation induced gastric ulceration

Table No.7: Gastric Juice Profile

Group	pH
Control	1.75±0.493
Sample 200	4.013±0.351
Sample 100	3.07±0.306

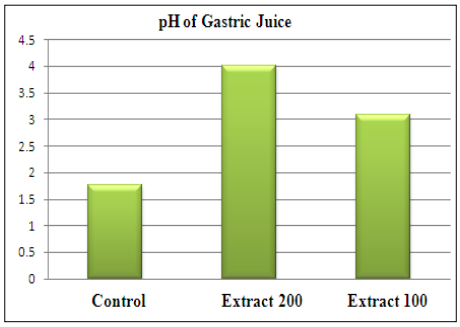


Figure 5: pH of Gastric Juice Profile

Table No. 8: Total Gastric volume

Group	Total Gastric volume
Control	5.27±0.432
Sample 200	4.013±0.351
Sample 100	3.07±0.306

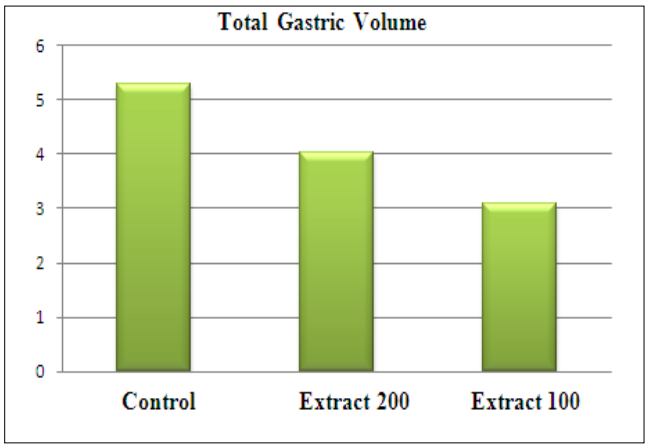


Figure 6: Total Gastric volume

Table No. 9: Total acidity

Group	Total acidity
Control	63.33±8.617
Sample 200	30.67±5.508
Sample 100	37.00±3.606

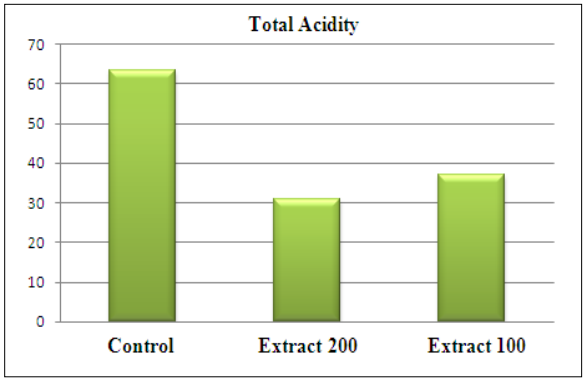


Figure 7: Total acidity

Table No.10: Free acidity

Group	Free acidity
Control	33.17±6.431
Sample 200	13.33±2.517
Sample 100	20.33±1.528

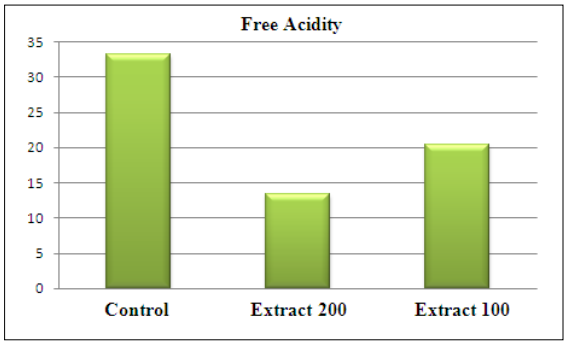


Figure 8: Free acidity

Table No. 11: Ulcer index

Group	Ulcer index
Control	10.93±0.081
Sample 200	4.92±2.097
Sample 100	8.50±3.031

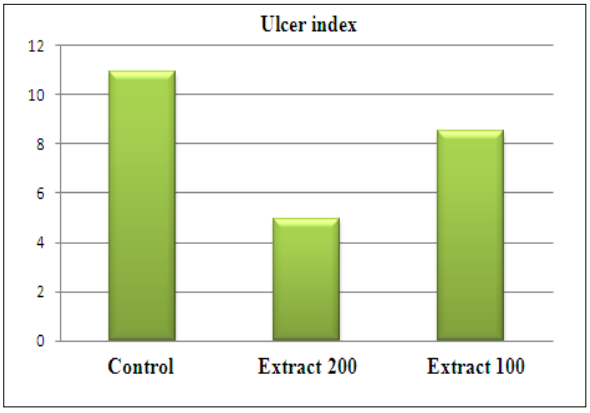


Figure 9: Ulcer index

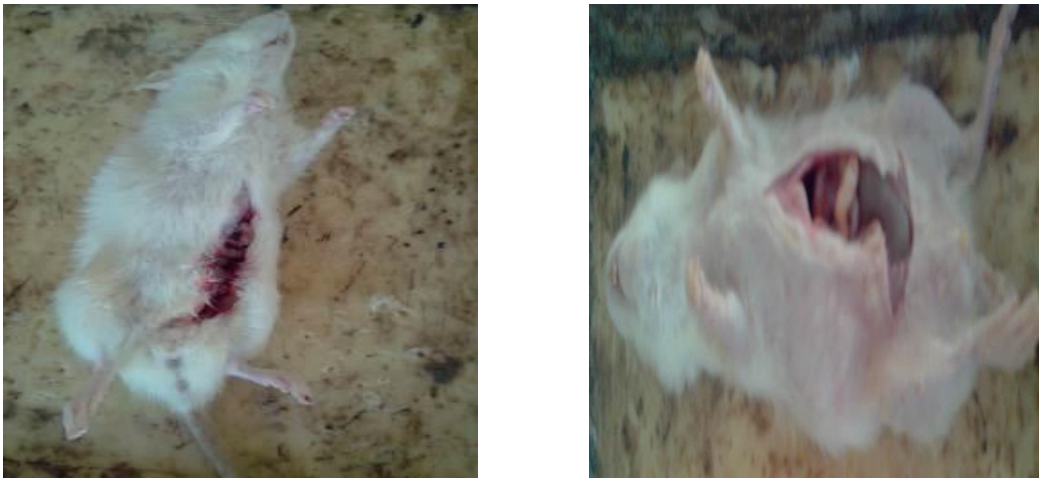


Figure 10: Scarification of stomach for ulcer index

Figure 11: Determination of ulcer index

The extract was evaluated for their anti-ulcer activity in Pylorus ligation induced ulcer model in male wistar rats. The significant increase in the antiulcer activity of *Coriandrum sativum* could be attributed to the presence of flavanoids, alkaloids and Phenols compounds. Flavanoids are among the cytoprotective materials for which antiulcerogenic efficacy has been extensively confirmed. It is suggested that, these active compounds would be able to stimulate mucus, bicarbonate and the prostaglandin secretion and counteract with the deteriorating effects of reactive oxidants in gastrointestinal lumen. So the antiulcer activity of *Coriandrum sativum* may be attributed to its flavanoids content.

DISCUSSION

The crude extracts so obtained after the soxhlet extraction process, extract was further concentrated on water bath evaporation the solvents completely to obtain the actual yield of extraction. To obtain the percentage yield of extraction is very important phenomenon in phytochemical extraction to evaluate the standard extraction efficiency for a particular plant, different parts of same plant or different solvents used. The yield of extracts obtained from different samples using different solvent, The maximum percetage yield was found in aqueous extract 8.56.

A small portion of the dried extracts were subjected to the phytochemical test using standard methods to test for alkaloids, glycosides, tannins, saponins, flavonoids and steroids separately for extracts of all samples. Small amount of each extract is suitably resuspended into the sterile distilled water to make the concentration of 1 mg per ml. The methanolic extract of selected plant showed the presence of Flavonoids, Diterpenes, Phenolics, Amino Acids, Proteins and Saponins. The methanolic extract showed the presence of phenols and Flavonoids which is responsible for antioxidant potantial and various pharmacological potential.

The content of total phenolic compounds (TPC) content was expressed as mg/100mg of gallic acid equivalent of dry extract sample using the equation obtained from the calibration curve:

$Y = 0.042X+0.002$, $R^2= 0.999$, where X is the gallic acid equivalent (GAE) and Y is the absorbance

The content of total flavanoid compounds (TFC) content was expressed as mg/100mg of quercetin equivalent of dry extract sample using the equation obtained from the calibration curve: $Y = 0.06X+0.019$, $R^2= 0.999$, where X is the quercetin equivalent (QE) and Y is the absorbance. The maximum phenols (GAE 1.911 mg/100mg) and flavanods (QE 1.270 mg/100mg) was found in methanolic extract which is used for further activity.

Free radicals are the cause for several major disorders. So, evaluation of antioxidant activity in plants could result in the discovery of natural antioxidants with pharmacological and food value. The importance of phenol compounds in plants as natural antioxidants and their use as substitutes to synthetic antioxidants in food additives is well known. Therefore, there observation can be used in pharmaceutical to explore new drugs. Thus the present aim is to assess the antioxidant activity of *Coriandrum sativum* L. by DPPH method and also compared the % antioxidant activity with standard ascorbic acid. The DPPH free radical scavenging activity of the methanolic extract of the plant material of *Coriandrum sativum* L. In our experiment ascorbic acid which was taken as standard. For all samples the assay was carried out in triplicate.

The extract was evaluated for their anti-ulcer activity in Pylorus ligation induced ulcer model in male wistar rats. The significant increase in the antiulcer activity of *Coriandrum sativum* could be attributed

to the presence of flavanoids, alkaloids and Phenols compounds. Flavanoids are among the cytoprotective materials for which antiulcerogenic efficacy has been extensively confirmed. It is suggested that, these active compounds would be able to stimulate mucus, bicarbonate and the prostaglandin secretion and counteract with the deteriorating effects of reactive oxidants in gastrointestinal lumen. So the antiulcer activity of *Coriandrum sativum* may be attributed to its flavanoids content.

CONCLUSION

From our present study it is concluded that Methanol extract of *Coriandrum sativum* has got moderate anti-ulcer potential against pylorus ligated rat. The preliminary phytochemical studies revealed the presence of flavonoids in alcoholic extract of *Coriandrum sativum*; various flavonoids have been reported for its anti-ulcerogenic activity with good level of gastric protection. So the possible mechanism of anti- ulcer action of *Coriandrum sativum* may be due to its flavonoid content. In this study we observed that *Coriandrum sativum* provides significant anti-ulcer activity against gastric ulcers in rats.

ACKNOWLEDGEMENT

Authors are thankful to the Director, Technocrats Institute of Technology Pharmacy Education & Research, Bhopal, M.P. for providing necessary facilities during experimentation.

REFERENCES

1. Nasreen J, Shagufta N and Ghufran A. Efficacy of Tukhm Kishneez(Coriandrum sativumLinn.) In stress induced gastric ulcer Journal of Unani Research. 2011; 1(1):17-22.
2. Al-Mofleh IA, Al-Haider AA, Mossa JS, Al-Sohaibani MO and Rafatullah S. Aqueous suspension of anise “Pimpinella anisum” protects rats against chemically induced gastric ulcers. World J Gastroenterol. 2007; 13 (7):112-8.
3. Pathak Nimish L, Kasture Sanjay B, Bhatt Nayna M and Rathod Jaimik D. Phytopharmacological Properties of *Coriander Sativum* as a Potential Medicinal Tree: An Overview. Journal of Applied Pharmaceutical Science. 2011; 01 (04):20-25.
4. Ali Esmail Al-Snafi. A review on chemical constituents and pharmacological activities of Coriandrum sativum. IOSR Journal of Pharmacy. 2016; 6(7):17-42.
5. Darughe, F, Barzegar M and Sahari, MA. Antioxidant and antifungal activity of Coriander (*Coriandrum sativum* L.) Essential oil in cake. International Food Research Journal. 2012; 19 (3): 1253-60.

6. Debella A, Feleke A, Makonnen E, Tilahun G and Eguale T. In vitro and in vivo anthelmintic activity of crude extracts of Coriandrum sativum against Haemonchus contortus, J. Ethnopharmacol. 2007; 110:428-433.
7. Deepa B and Anuradha CV. Antioxidant potential of coriander sativum L seed extract. J. Exp. Biol. 2011; 49: 30-38.
8. Mukherjee PK. Quality Control of Herbal Drugs, 2nd Edition, Business Horizons. 2007; 2-14.
9. Khandelwal KR. Practical Pharmacognosy Technique and Experiments, 23rd Edn. 2005;15-29, 149,56.
10. Kokate CK. Ed. Practical Pharmacognosy, 4th Edn., Vallabh Prakashan: 1994;112:120.
11. Olufunmiso, Olajuyigbe O and Afolayan Anthony J. Phenolic conyent and antioxidant property of the bark extract of *Ziziphus mucronata* wild. Subsp. Mucronata wild, BMC, Complementary and alternative medicine. 2011; 11: 130.
12. Dashputre NL and Naikwade NS. Evaluation of Anti-Ulcer Activity of Methanolic Extract of *Abutilon indicum* Linn Leaves in Experimental Rats, International Journal of Pharmaceutical Sciences and Drug Research. 2011; 3(2): 97-100.