Preliminary Phytochemical Analysis and Diuretic Activity of the Extracts of Coriandrum Sativum Leaves in Wistar Albino Rats

Shobna Thuraisingam¹, J. Anbu Jeba Sunilson², A. V. Anita Gnana Kumari¹, K. Anandarajagopal¹

¹School of Pharmacy, KPJ Healthcare University College, Kota Seriemas, Nilai 71800, Negeri Sembilan, Malaysia
²Department of Siddha Medicine, Faculty of Science, Tamil University, Thanjavur 613010 Tamil Nadu, India

Email address: anbujunil@gmail.com

Abstract—Coriandrum Sativum plant is used in the traditional medicine as diuretic. In the present study the diuretic activity of methanol and aqueous extract of leaves of coriander sativum was studied and the activity was compared with furosemide as standard. Methanolic extract exhibited significant diuretic activity as evidenced by increased total urine volume and the urine concentration of Na⁺, K⁺, and Cl⁻. The results thus support that coriander sativum leaves extract uses as a diuretic agent.

Method: Wistar albino rats (150-200g) of either sex were used for the study. Animals were divided into 6 groups, each containing 6 animals. Group 1 served as a normal group and received normal saline (2.5ml/kg p.o), group 2 served as control group received furosemide (10 mg/kg p.o) body weight in saline (2.5 ml/kg p.o), group 3 served as test group and received methanol extract 400 mg/kg body weight daily through oral route together with normal saline (2.5ml/kg p.o), group 4 served as test group received water extract 400 mg/kg body weight daily through oral route together with normal saline (2.5ml/kg p.o). The urine was collected in a measuring cylinder up to 6 h. The parameters taken for individual rat were body weight before and after test period, total concentration of Na⁺, K⁺ and Cl⁻ in the urine.

Results: In the furosemide treated group, it has showed significant increase in potassium level in the urine, in the extract treated groups with methanol and aqueous, shows increasing sodium excretion more than the potassium which is considered as a very potent safe profile of diuretic agent.

Conclusion: The aim of this study was to validate the traditional claims of coriandrum sativum with respect to potential diuretic activity and to identify the possible phytoconstituents present in the leaves by using qualitative chemical test and thin layer chromatography. The preliminary phytochemical studies reveal the presence of flavonoids, glycosides and saponins which are the major compounds presence in the extract of c. sativum leaves.

Keywords—Diuretic activity, Coriandrum sativum, flavonoids.

I. INTRODUCTION

According to the traditional Indian medicine, coriandrum sativum leaves extract has been used as a diuretic and to promote healthy kidney function. Traditionally, the leaves of coriandrum sativum are prepared into a drinkable drink. It is done by washing bunch of fresh c. sativum leaves and cleaning it thoroughly in water in order to remove dirt and any residual harmful pesticides that might be sticking on the leaves. Next, the leaves are chopped as small as possible and it is placed in the vessel by adding filtered water to be boiled for 10 minutes. After boiling is done, the liquid is allowed to be cooled and filtered by using sieve to trap the residue of the leaves. The filtered liquid is poured in to a sterilize glass bottle and stored in a refrigerator for further future usage. It is known that by drinking one glass daily of this preparation, an individual may notice increase of urine volume which is believe to be salts and toxic (1). C. sativum has showed significance in medical herb, in treating disorders such as urinary tract problems and acts as diuretics. Therefore, this study is carried out to identify and investigate scientifically of the c. sativum leaves extract that has been claimed by Indian traditional healers to act as a diuretic.

II. MATERIALS AND METHODS

2 kg leaves of Coriandrum sativum was collected in the month of May 2016 from Kuala Lumpur, Malaysia and was authenticated by a pharmacognosist from KPJ Healthcare University College. A voucher specimen was deposited at herbarium KPJUC, Negeri Sembilan, Malaysia. KPJUC, Nilai. (KPJUC/CRI/PA/2016(08))

III. PREPARATION OF THE EXTRACT

The plant leaves of Coriandrum sativum was dried under shade below 40 °C, for 5 days, then the dried leaves has been pulverized to coarse powder using mechanical blender. The coarsely powdered (2 kg) Coriandrum sativum has been macerated successively with methanol and aqueous, for 7 days with continuous shaking. After 7 days of extraction; it was filtered by using Whatman filter paper and evaporated to dryness using rotatory vacuum evaporator. Then, the extract kept in a dessicator for the phytochemical and pharmacological studies. The colour, consistency and percentage yield was recorded in Table 1. Preliminary phytochemical studies have been conducted to both methanol and aqueous extract of the c. sativum leaves. The preliminary phytochemical constituent present in various extract of leaves
of *C. sativum* were tabulated in Table 2. To further confirmed the presence of phytoconstituent, TLC studies were carried out using n-butanol: acetic acid: water (4:1:5) and phenol: water (3:1) for both the extracts. The presence of R<sub>f</sub> value on the TLC plate were calculated at different spots and the values were recorded in Table 3.

IV. DIURETIC ACTIVITY

Wistar albino rats (150-200g) of either sex were used for the study. Animals were divided into 6 groups, each containing 6 animals. Group 1 served as a normal group and received normal saline (2.5 ml /kg p.o), group 2 served as control group received furosemide (10 mg/kg p.o) body weight in saline (2.5 ml /kg p.o), group 3 served as test group received methanol extract 400 mg/kg body weight daily through oral route together with normal saline (2.5 ml /kg p.o). and group 4 served as test group received water extract 400 mg/kg body weight daily through oral route together with normal saline (2.5 ml /kg p.o). The urine was collected in a measuring cylinder up to 6 h. The parameters taken for individual rat were volume of urine, total concentration of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> in the urine. After administration of the extracts, the animals were placed in metabolic cages (designed mesh) especially to separate urine and faeces and it kept at room temperature of 25± 0.5°C. The urine was collected in a measuring cylinder up to 6 h. During this period, no food or water was made available to the animals. The volume of urine collected was measured for all the groups. The parameters taken for individual rat were weight body weight before and after test period, total concentration of Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> in the urine. Na<sup>+</sup>, K<sup>+</sup> concentration were measured by flame photometry and Cl<sup>-</sup> concentration was estimated by titration with silver nitrate solution (N/50) using three drops of 5% potassium chromate solution as indicator (2).

V. STATISTICAL ANALYSIS

All the results obtain are represented and expressed as mean ± S.E.M. The data was analyzed statistically using ANOVA followed by Dunnett’s t-test

VI. RESULTS

The phytochemical tests revealed the presence of flavonoids, saponins, alkaloids and other phytoconstituent. The results of phytochemical is given in Table 1. The TLC profile also showed minimum of three spots and maximum of seven spots with the different R<sub>f</sub> value (Table 3). The diuretic activity of *C. sativum* leaves provide the therapeutical efficency. The results of diuretic activity of the extract are shown in figure 1. The methanolic extracts (400 mg/kg) exhibit a potent diuretic activity which was followed by aqueous extract (400 mg/kg). This activity may be due to the presence of numerous phytoconstituents present in the leaves. Future studies like isolation and structural elucidation of the extracts will be needed to confirm the activity. From the present study, it may conclude that the extracts of *C. sativum* posses diuretic activity is justifiable.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Chemical Constituents</th>
<th>Ethanol Extract</th>
<th>Aqueous Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Alkaloids</td>
<td>Mayer’s test</td>
<td>Mayer’s test</td>
</tr>
<tr>
<td>2.</td>
<td>Carbohydrates and Glycosides</td>
<td>Molisch’s test</td>
<td>Molisch’s test</td>
</tr>
<tr>
<td>3.</td>
<td>Proteins and Amino acids</td>
<td>Biuret test</td>
<td>Biuret test</td>
</tr>
<tr>
<td>4.</td>
<td>Sterols</td>
<td>Ninhydrin test</td>
<td>Ninhydrin test</td>
</tr>
<tr>
<td>5.</td>
<td>Tannins-Phenolic Compounds</td>
<td>Liebermann sterol test</td>
<td>Liebermann sterol test</td>
</tr>
<tr>
<td>6.</td>
<td>Saponins</td>
<td>Leucine acetate test</td>
<td>Leucine acetate test</td>
</tr>
<tr>
<td>7.</td>
<td>Gums and Mucilage</td>
<td>Sodium hydroxide</td>
<td>Sodium hydroxide</td>
</tr>
<tr>
<td>8.</td>
<td>Fixed Oils and Fats</td>
<td>Foam test</td>
<td>Foam test</td>
</tr>
<tr>
<td>9.</td>
<td>Flavones</td>
<td>Aq. Sodium hydroxide</td>
<td>Aq. Sodium hydroxide</td>
</tr>
</tbody>
</table>

+ = Present , - = Absent

<table>
<thead>
<tr>
<th>Test samples</th>
<th>Solvent system</th>
<th>R&lt;sub&gt;f&lt;/sub&gt; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol extract</td>
<td>Butanol:acetic acid:water (4:1:5)</td>
<td>0.57</td>
</tr>
<tr>
<td>Water extract</td>
<td>Butanol:acetic acid:water (4:1:5)</td>
<td>0.36</td>
</tr>
<tr>
<td>Methanol extract</td>
<td>Phenol:water (3:1)</td>
<td>0.30</td>
</tr>
<tr>
<td>Water extract</td>
<td>Phenol:water (3:1)</td>
<td>0.17</td>
</tr>
</tbody>
</table>

This study showed that methanol extract (400 mg/kg bwt) produces a significant diuretic activity by increasing the urine output, sodium, and potassium and chloride ions. This activity was followed by the aqueous extract (400 mg/kg bwt) which is well comparable with the standard diuretic agent furosemide (10 mg/kg bwt).

**VII. DISCUSSIONS**

Diuretic activity may be related to the conditions like hypertension, heart failure, hypercalciuria and liver cirrhosis (3). In the present study it has been demonstrated that the methanolic and aqueous extract showed diuretic activity by increasing the urine volume, sodium, potassium and chloride ions. In the furosemide treated group, it has showed significant increase in potassium level in the urine, which may increase the risk of hypercalcemia, it is one of the potential adverse effect of synthetic diuretic such as furosemide but in the extract treated groups with methanol and aqueous shows increasing sodium excretion more than the potassium which is considered as a very potent safe profile of diuretic agent (4). Active principles of flavanoids, glycosides and saponins are known to have diuretic activity (5)(6)(7)(8). The preliminary phytochemical studies reveals the presence of these components in the leaves of *Coriandrum sativum* which further confirmed by thin layer chromatography. It may suggest that the secondary metabolites present in the leaves posses diuretic activity. The effect maybe produces by stimulating regional blood flow or initial vasodilation or by producing inhibition of tubularly reabsorptions of water and anions (9).

**ACKNOWLEDGEMENT**

Authors thank school of Pharmacy, KPJ Healthcare University College, Negeri Sembilan, Malaysia for providing facilities and encouragement throughout the study.

**REFERENCES**