**ABSTRACT**

The present study was aimed at evaluating the antioxidant activities of *Murraya koenigii* known for their medicinal properties in folk medicine. In an effort to reduce the undesirable consequences of synthetic food conservatives in human health and food industries, scientists have recently changed their interest to search new conservatives. Antioxidants are important inhibitors of lipid peroxidation not only as a defense mechanism of living cells against oxidative damage but also for food preservation. The free-radical scavenging activities of prepared extracts of *Murraya koenigii* were carried out using DPPH (1,1–Diphenyl-2-Picryl-Hydrazyl). The results showed that all extracts of *Murraya koenigii* had radical scavenging activity. This study showed that Ethanolic extract of *Murraya koenigii* possess maximum antioxidant activity i.e. 88.31% out of all the extracts. Further research should be carried out to isolates compounds with radical scavenging capacity for industrial applications.

**Keywords:** Murraya koenigii, Antioxidant activity, Studies.

**INTRODUCTION**

*Murraya koenigii*, a plant belonging to family Rutaceae. It is a tree of about 2 meters tall, it often forms undergrowth in forest throughout India and in Andaman islands, growing up to an altitude of 1500 m. The plant originate in the tarai region of Uttar Pradesh, India and is now widely found in hills of Uttaranchal, Sikkim, Bengal, Assam, central India and Kerala. The plant is used in Indian system of medicine.\(^1\)\(^2\)
The aromatic leaves, which retain their flavour and other qualities even after drying, are slightly bitter, cooling, weakly acidic in taste and are considered as tonic, anthelmintic, analgesic, digestive, appetizing and are widely used in Indian cookery for flavouring foodstuffs. The green leaves are used to treat piles, inflammation, itching, fresh cuts, dysentery, vomiting, burses and dropsy. The roots are slightly purgative, stimulant and used for general body aches, whilst the bark is used to treat snakebite.[3-4]

MATERIALS AND METHODS
1. Collection of leaves of Murraya koenigii.
Leaves of Murraya koenigii were collected from area around Tilak nagar, Delhi during the month of Oct to Dec. The collected plant material was washed with water to remove mud and other undesirable material and dried under shade.

2. Extraction of leaves of Murraya koenigii in different solvents (Non-polar to Polar)
The collected plant material was washed with water to remove other undesirable material and dried under shade. The air-dried leaves (500 gm) of Murraya koenigii were crushed. The crushed leaves extracted with different solvents of increasing polarity viz. Petroleum ether, Chloroform, Acetone and Methanol by hot percolation method using Soxlet Apparatus. The extract was evaporated till dryness to obtain residue. These extracts were concentrated under reduced pressure.

3. Anti oxidant activity of leaves extract
Mechanism of DPPH method
The molecule of 1,1-diphenyl-2-picrylhydrazyl (α,α-diphenyl-β-picrylhydrazyl; DPPH:1) is characterized as a stable free radical by virtue of the delocalization of the spare electron over the molecule as a whole, so that the molecules do not dimerise, as would be the case with most other free radicals. The delocalization also gives rise to the deep violet colour, characterized by an absorption band in ethanol solution centered at about 520 nm.

1: Diphenylpicrylhydrazyl (free radical)  
2: Diphenylpicrylhydrazine (nonradical)
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 (2) with the loss of this violet colour (although there would be expected to be a residual pale yellow colour from the picryl group still present). Representing the DPPH radical by Z• and the donor molecule by AH, the primary reaction is 

$$Z• + AH = ZH + A•$$ [1] 

where ZH is the reduced form and A• is free radical produced in this first step. This latter radical will then undergo further reactions which control the overall stoichiometry, that is, the number of molecules of DPPH reduced (decolorised) by one molecule of the reductant.

The reaction is therefore intended to provide the link with the reactions taking place in an oxidising system, such as the autoxidation of a lipid or other unsaturated substance; the DPPH molecule Z• is thus intended to represent the free radicals formed in the system whose activity is to be suppressed by the substance AH

### Methodology of DPPH method

- Preparation of DPPH (1,1-diphenyl-2-picrylhydrazyl) solution
- Preparation of Ascorbic acid Solution
- Preparation of stock solution of Murraya koenigii (Test sample) extract
- Preparation of different concentration of Murraya koenigii (Test sample) extract from stock solution
- Preparation of test sample
- Preparation of standard
- Incubation
- Measurement of absorbance
- Calculations

### Preparation of DPPH

DPPH is a highly oxidisable compound. It oxidized in light, so DPPH is prepared in dark. Weigh accurately 20 mg DPPH and dissolved in solvent. Generally Methanol and for some cases Ethanol is used as a solvent for DPPH.

### Preparation of standard Ascorbic acid solution

Ascorbic acid is an strong anti oxidizing agent. It is taken as standard. Standard solution of ascorbic acid is prepared. viz. 100 µg/ml, 300 µg/ml and 500 µg/ml.
Preparation of different concentration of *Murraya koenigii* extract

Different concentration of the test sample *Murraya koenigii* extract which is to be examined for antioxidant activity is prepared. viz. 100 µg/ml, 300 µg/ml, and 500 µg/ml.

Preparation of test sample

3 ml of different concentration of test sample *Murraya koenigii* extract was mixed with 1 ml of DPPH solution in dark.

Preparation of standard

3 ml of different concentration of standard solution of ascorbic acid was mixed with 1 ml of DPPH solution in dark.

Incubation

The prepared solution of ascorbic acid and test sample was incubated for 1/2 half an hour.

Measurement of absorbance

When procedure is done than absorbance is taken with the help of U.V. Spectrophotometer at 517 nm.

Calculation

We calculate the % activity of individual concentration of individual extract from the following formula

\[
\text{% Activity} = \frac{\text{Abs. of control} - \text{Abs. of individual concentration}}{\text{Abs. of control}} \times 100
\]

Abs. = Absorbance.

RESULTS

Table-1. Absorbance of Pet. Ether extract of *Murraya koenigii* :

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Concentration In(µg/ml)</th>
<th>Pet. Ether extract</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>1.174</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>1.074</td>
<td>8.518%</td>
</tr>
<tr>
<td>5</td>
<td>300</td>
<td>0.824</td>
<td>29.81%</td>
</tr>
<tr>
<td>7</td>
<td>500</td>
<td>0.775</td>
<td>33.986%</td>
</tr>
</tbody>
</table>
Table-2. Absorbance of Chloroform extract of Murraya koenigii

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Concentration In (µg/ml)</th>
<th>Chloroform extract</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>1.379</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>1.232</td>
<td>10.66%</td>
</tr>
<tr>
<td>5</td>
<td>300</td>
<td>0.945</td>
<td>31.47%</td>
</tr>
<tr>
<td>7</td>
<td>500</td>
<td>0.756</td>
<td>45.17%</td>
</tr>
</tbody>
</table>

Table-3. Absorbance of Ethanol extract of Murraya koenigii

<table>
<thead>
<tr>
<th>S.no.</th>
<th>Concentration In(µg/ml)</th>
<th>Ethanol extract</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>1.361</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>0.296</td>
<td>78.25%</td>
</tr>
<tr>
<td>5</td>
<td>300</td>
<td>0.270</td>
<td>80.024%</td>
</tr>
<tr>
<td>7</td>
<td>500</td>
<td>0.159</td>
<td>88.31%</td>
</tr>
</tbody>
</table>

Ethanol extract of *Murraya koenigii* leaves showed maximum Antioxidant activity in comparison to all extracts. The concentration of 500 µg/ml of Ethanol extract showed 88.31% anti-oxidant activity in comparison to all extract and standard drug. Chloroform extract showed higher anti-oxidant activity in comparison to Pet. Ether extracts. 500 µg/ml concentration of Chloroform extract showed 45.83 % higher anti-oxidant activity in comparison to Petroleum ether. Pet. ether extracts showed weak anti-oxidant activity. Ascorbic acid is used as a standard drug for comparison to all extracts.

**CONCLUSION**

From Anti-oxidant studies it is concluded that Ethanol extract showed maximum Anti-oxidant activity as comparison with other extracts (Chloroform and Pt. ether), further study is needed for isolation of active principle. The results revealed that Ethanolic extract has a high antioxidant activity followed by flavonoids and alkaloids extracts suggesting the potential of this plant as a natural source of strongly antioxidant substances that can be use as a natural additive in food and pharmaceutical industries.

**REFERENCES**
