INTRODUCTION:

Lemongrass or Citronella grass is native to India, Southeast Asia, and Oceania(1,2). It is widely used as a herb in Asian cuisine and also as medicinal herb in India. It has a subtle citrus flavor and can be dried and powdered, or used fresh. It is commonly used in teas, soups, and curries. It is often used as a tea in African countries such as Togo and the Democratic Republic of the Congo and Latin American countries such as Mexico. Lemongrass oil is used as a pesticide and a preservative. Lavender oil on the other hand is an essential oil obtained by distillation from the flower spikes of certain species of lavender. Two forms are distinguished, lavender flower oil, a colorless oil, insoluble in water, having a density of 0.885 g/mL; and lavender spike oil, a distillate from the herb Lavandula latifolia, having density 0.905 g/mL. Lavender flower oil is a designation of the National Formulary and the British Pharmacopoeia. The purpose of my research is to compare the antioxidant effects of lemongrass and lavender using the oil extracts from these herbs.

Abstract

Lemongrass has been evaluated for its antioxidant properties. Lemongrass is native to India, Southeast Asia, and Oceania. It is widely used as a medicinal herb in India. It has a subtle citrus flavor and can be dried and powdered, or used fresh. It is commonly used in teas, soups, and curries. It is often used as a tea in African countries such as Togo and the Democratic Republic of the Congo and Latin American countries such as Mexico. Lemongrass oil is used as a pesticide and a preservative. Lavender oil on the other hand is an essential oil obtained by distillation from the flower spikes of certain species of lavender. Two forms are distinguished, lavender flower oil, a colorless oil, insoluble in water, having a density of 0.885 g/mL; and lavender spike oil, a distillate from the herb Lavandula latifolia, having density 0.905 g/mL. Lavender flower oil is a designation of the National Formulary and the British Pharmacopoeia. The purpose of my research is to compare the antioxidant effects of lemongrass and lavender using the oil extracts from these herbs.
known as volatile oils evaporate in contact with air possess a pleasant fragrance. Chemically the essential oils are very complex. All aromatic plants contain essential oils.(3) The genus cymbopogon comprises 140 species that are widely distributed in the world. Cymbopogon citratus known as West Indian Lemon grass is an important species of poaceae family. The leaf blade is linear tapered at both ends and can grow to a length of 50cm(4) Both Lavender and Lemon grass oil are essential oil obtained by distillation from the flower spikes of Lavender and leaves of Lemon grass respectively. The current study aims at phytochemical analysis of Lavender oil and Lemon grass oil and a comparative study on total phenolics, flavonoids and antioxidant activity of both the oils.

METHODS:

**Tannins**
To 5ml of the sample, a few drops of 0.1% Ferric chloride were added. The presence of a brownish green or blue black color indicated that the material possessed Tannins.

**Phlobatannins**
Ten ml of the sample was boiled with 1% HCl in a test tube. The presence of Phlobatannins was confirmed by the deposition of red precipitate in the tube.

**Saponins**
To 10 ml of the sample, 3 ml of distilled water was added and shaken well, so as to obtain froth. To the froth formed, a few drops of Olive oil were added. The formation of emulsion indicates the presence of saponins.

**Flavonoids**
A few drops of 1% liquor ammonia were taken in test tube, to which the sample was added. Yellow coloration of the solution confirmed the presence of Flavonoids.

**Terpenoids**
Around 2 ml of chloroform and 3 ml of concentrated sulphuric acid were added consecutively to 5 ml of the sample. A reddish brown interface in the solution denoted the presence of Terpenoids.

**Cardiac Glycosides**
To 5 ml of the sample, 2 ml of glacial acetic acid containing a drop of Ferric chloride was added. This was followed by the addition of 1 ml of concentrated sulphuric acid. The brown ring, thus obtained, yield positive result for the test.

**Steroids**
A couple of grams of the plant powder were mixed with 10 ml of chloroform, followed by boiling and filtration. To the above 2 ml of the filtrate 2 ml acetic anhydride and a few drops of concentrated sulphuric acid was added. Stable presence of blue-green ring in the solution confirms the presence of steroids.

**DETERMINATION OF TOTAL PHENOLIC CONTENT**
Folin-Ciocalteu method was followed for the determination of the total phenolic content of the sample. Distilled water (500 μL) and Folin-Ciocalteu reagent (100 μL) were added to 100 μL of the plant extract and incubated for 6 min at room temperature. The final volume of the solution was made up to 3 mL after addition of 1.25 mL of 7% sodium carbonate. The absorbance was measured at 760 nm using UV- Visible spectrophotometer after an incubation period of 90 min. The total phenolic content was expressed as mg TAE (Tannic acid equivalents) per g of the dry weight (mg TAE/g DW) of the sample, using a standard plot of Tannic acid.

**DETERMINATION OF TOTAL FLAVONOID CONTENT**
The sample (200 μL) was taken in a test tube and the solvent was allowed to evaporate. To the residue, 5 mL of 0.1 M Aluminium chloride was added and shaken well. This was followed by incubation for forty minutes at room temperature and the absorbance value was measured at 415 nm using UV- Visible spectrophotometer. A standard plot of Quercetin at varying concentrations was used to evaluate the total flavonoid content, expressed as mg QE/g DW of the sample.

**DPPH FREE RADICAL SCAVENGING ASSAY**
The sample was taken at various concentrations (10, 20, 30, 40 and 50 μg/mL), in small tubes and made up to 1 mL using methanol. One mL of DPPH was added to all the test concentrations and maintained in the dark for 30 minutes, at room temperature. The absorbance of the solutions was read at 517 nm. The percentage inhibition and the IC50 values were calculated with DPPH as the control and Butylated Hydroxyanisole (BHA) as the reference. The concentration in μg of dry material per mL of solvent (μg/mL) that inhibits the formation of DPPH radicals by 50% is defined as IC50 value.

% Inhibition= (Absorbance of the control–Absorbance of the sample)*100/Absorbance of the control

2,2’-AZINO-BIS(3-ETHYLBENZOTHIAZOLINE-6-SULPHONIC ACID (ABTS) ASSAY
A solution of 7 mM ABTS [2,2’-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)] and 2.45 mM potassium persulphate was incubated in the dark for 12-16 h, after which the solution was diluted with ethanol till the absorbance reached 0.7±0.02 at 734 nm. One mL of the diluted solution was mixed with 100 μL of the sample and the absorbance was evaluated at 734 nm after 6 min. The percentage reduction against ABTS was calculated with reference to the standard, Tannic acid

% Inhibition= (Absorbance of the control–Absorbance of the sample)*100/Absorbance of the control

**RESULTS :**

<table>
<thead>
<tr>
<th>Phytochemical</th>
<th>Lavender oil</th>
<th>Lemon grass oil</th>
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<tbody>
<tr>
<td>Tannins</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Saponins</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Terpenoids</td>
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<tr>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Cardiac Glycosides</td>
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<tr>
<td>Steroids</td>
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<td>-</td>
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<tr>
<td>Phlobatannins</td>
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<tr>
<td>Phenols</td>
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Total phenolic content(mg TAE/g DW)
Lavender oil - 0.6431 ± 0.0012
Lemongrass oil -0.7242 ± 0.0008

Total flavonoid content (μg QE/g DW)
Lavender oil -0.0989±0.0102
Lemongrass oil-0.1241 ± 0.0081
DPPH free radical scavenging assay

%Inhibition

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Lavender oil</th>
<th>Lemongrass oil</th>
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<tbody>
<tr>
<td>10</td>
<td>9</td>
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</table>

IC 50 (µg/ml)

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Lavender oil</th>
<th>Lemongrass oil</th>
<th>BHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC 50</td>
<td>&gt;50</td>
<td>50</td>
<td>25.78</td>
</tr>
</tbody>
</table>

2,2'- Azino-bis(3-ethylbenzothiazoline-6-sulphonic acid (ABTS) assay

%Inhibition

Lavender oil - 62.57
Lemongrass oil - 71.46

DISCUSSION:
Lemongrass oil and Lavender oil were tested for their phytochemical and antioxidant properties. Lemon grass oil and lavender oil contain phytochemicals like tannins, saponins, terpenoids etc. Flavonoids the phytochemical confirmed to be present in lavender oil have antioxidant activity. Flavonoids are becoming very popular because they have many health-promoting effects. Some of the activities attributed to flavonoids include: anti-allergic, anti-cancer, antioxidant, anti-inflammatory and anti-viral. The non-sugar part of saponins have also a direct antioxidant activity, which may result in other benefits such as reduced risk of cancer and heart diseases. Tannic acid has anti-bacterial, anti-enzymatic and astringent properties. Apart from this tannic acid has very good antioxidant properties that is very beneficial. The presence of these phytochemicals in lavender oil and lemon grass oil explains the antioxidant properties and its beneficial effect. More research may be required to throw light on the phytoconstituents in the oils.

REFERENCES :