ANTI-BACTERIAL ACTIVITY OF FERMENTED METHANOLIC EXTRACTS OF SKIN OF *ALLIUM CEPA*

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ABSTRACT

*Allium cepa* one of the richest natural source of flavonoids. Among flavonoids present in the onion, quercetin is well-known major substances. The objective of this study was to investigate the antibacterial activity of Quercetin extracted from fermented skin of *Allium cepa*. The anti bacterial activity was evaluated against *Bacillus subtilis, Klebsiella pneumonia, Escherichia coli, Bacillus cereus, Staphylococcus aureus* and *Enterobacter aerogenes* bacterial strains by Agar well diffusion method. The zones of inhibition were found to be 2 mm, 6 mm, 8mm, 6 mm, 7 mm and 5 mm respectively.


INTRODUCTION

*Allium cepa* belongs to the family liliaceae or Alliaceae. Onions are easily propagated, transported and stored. Onion skin is a natural source of ingredients with high functional value, because this vegetable is rich in compounds that provide benefits for human health.\(^1\) The brown skin could be used as a functional ingredient high in dietary fibre and phenolic compounds, such as quercetin and other flavonoids.\(^2\) Fermentation changes the contents of active components in oriental drugs.

Onions are effective against common cold, heart disease, diabetes, osteoporosis, coughs and sore throat.\(^3\) They also act as bacteriostatic.\(^4\) Certain chemical compounds believed to have anti-inflammatory, anti-cholesterol, anticancer and antioxidant properties such as quercetin.
are present in onions. They are high in flavonoids which is concentrated on the outer layer of the flesh.

The antimicrobial activity was shown to be highly dependent on the content of phenolic compounds. The antibacterial activity of the onion decreases significantly from the external leaves to the internal leaves.

It has biological activities like antimicrobial, antiviral, antitumor etc, because of its alkaloid contents and many other chemical compounds like flavonoids, phenolic.

The present research work was carried out to evaluate the fermentation of skin of *Allium cepa* and to analyze the enhancement in the content of quercetin and its anti-bacterial activity.

**MATERIALS AND METHODS**

**Substrate**

Skin of *Allium cepa* were collected from local market in Visakhapatnam, Andhra Pradesh. The powdered sample is used as substrates for flavonoid production.

**Estimation of the compounds**

Total phenolic content was estimated according to the method of Folin-Denis. Quercetin was estimated according to the Aluminium chloride calorimetric assay method.

**Microorganisms**

*Bacillus subtilis, Klebsiella pneumonia, Escherichia coli, Bacillus cereus, Staphylococcus aereus* and *Enterobacter aerogenea* are the bacterial strains were used in this study.

**Maintenance of microorganisms**

The pure bacterial cultures were maintained nutrient agar slants for 2 - 3 days at 28°C. These cultures were further maintained by subculturing on the same medium and then stored at 4°C before use. 5 ml of sterile water was added to the slants, then the bacterial growth on the slants grated with sterile loop and then homogenized. This homogenized solution used as inoculum for bacterial growth.

**Preparation of extract**
Extract was collected from the fermentation of methanolic extract of Skin of *A. cepa* with *A. Kawachii*. The extract from three day fermented sample was purified by column chromatography using silica gel as a column. This purified extract was used further for antibacterial activity.

**Determination of antibacterial activity**

**Well Diffusion Method**

Antibacterial activity of plant extract was approximated by agar well diffusion method of (Murray *et al*., 1995).[13] modified by (Olurinola, 1996).[14]

15ml of nutrient agar was dispensed in sterile conical flasks, these were then inoculated with 0.5 ml of bacterial culture suspension, mixed softly and poured into sterile petri dishes. After sterilizing borer, used to make wells at the center of petri dish. A drop of liquefied nutrient agar was used to seal the base of each well. The wells were filled with 0.5 ml of plant extract of concentration 190 µg/ml and then place in refrigerator for 45 min to allow uniform diffusion. The solvent used for extract preparation were similarly analyzed as control. The plates were incubated at 30ºC for 48 hours. The zones of inhibition were compared with control zone scale in mm and the experiment was carried out in duplicates.

**RESULTS AND DISCUSSION**

Antibacterial activity for fermented methanolic extract of skin of *A. cepa* was evaluated against *Bacillus subtilis*, *Klebsiella pneumonia*, *Escherichia coli*, *Bacillus cereus*, *Staphylococcus aureus* and *Enterobacter aerogenes* bacterial strains and the inhibition zones were found to be: 2 mm, 6 mm, 8 mm, 6 mm, 7 mm and 5 mm respectively.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Zone of inhibition (mm)</th>
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<tbody>
<tr>
<td><em>Bacillus subtilis</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Klebsiella pneumonia</em></td>
<td>6</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>8</td>
</tr>
<tr>
<td><em>Bc</em></td>
<td>6</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>7</td>
</tr>
<tr>
<td><em>Enterobacter aerogenes</em></td>
<td>5</td>
</tr>
</tbody>
</table>

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Graph 1: Antibacterial activity graph on different bacterial strains.

**Control Test**

*Bacillus subtilis*

*Escherichia coli*

*Klebsiella pneumonia*
CONCLUSION
It was observed that fermented methanolic extract of skin of *Allium cepa* have great potential as antibacterial activity and can be used in the treatment of infectious diseases caused by resistant microorganisms. Fermented Skin of *Allium cepa* showed maximal antibacterial potential against *E. coli* and *S. aereus* among the tested organisms. Fermented methanolic extract of skin of *Allium cepa* have the potential to be used as antimicrobial agent in the food, cosmetics and pharmaceutical industries.

REFERENCES


