

# ***In-vitro* antioxidant activity of methanolic and antibacterial activity of ethanolic bark extracts of *Eucalyptus globules***

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**Abstract**— In this *in-vitro* study two crude extract by two different solvent of *Eucalyptus globules* was studied to evaluate the antioxidant activity by methanolic and antibacterial properties by ethanolic bark extracts. Its IC<sub>50</sub> value in Hydrogen peroxide radical scavenging activity method was 96.91 µg/ml. *Eucalyptus globules* showed concomitant increase in reducing power with the increase of concentration of the extract in percent inhibition power assay. The extract showed notable antimicrobial activities against some pathogens such as: *Bacillus cereus*, *Staphylococcus aureus* and *Eshcherichia coli*.

**Index Terms**— *in-vitro*; *Eucalyptus globules*; antioxidant activity; methanolic extract; antimicrobial properties; ethanolic extract.

## **1 Introduction**

Increased concentrations of free radicals in the body lead to various pathological conditions such as atherosclerosis, arthritis, Alzheimer disease, cancers etc. Detrimental effects resulted from the imbalance in the antioxidant-prooxidant ratio can be chiefly prevented by the intake of antioxidants (Haliwell *et al.*, 2007).

The indiscriminate use of germicidal impacts in the survival form of microorganisms particularly bacteria, which have developed multiple mechanisms to overcome the available antimicrobial agents from producing enzymes to inactivate drugs until genetic mutations and its transmission to new bacterial generation (Mota *et al.*, 2015). As a source of medicinal agents plants have been considered for the treatment of various diseases. Single and poly herbal preparations have been used throughout history for the treatment of various diseases (Ghalem *et al.*, 2008). Many of these compounds have therapeutic properties and are known for their anti-carcinogenic, anti-mutagenic, cardio protective, anti-neurodegenerative and antimicrobial activities (Rababah *et al.*, 2011; Gursoy *et al.*, 2009; Babich *et al.*, 2003 and Roy *et al.*, 2011).

*Eucalyptus globulus* is an evergreen tree, one of the most widely cultivated trees native to Australia and Tasmania bearing pendent leaves. It has a long history of folk usage because of its rich medicinal values. The plant has been reported to possess potent antiseptic, astringent, deodorant, diaphoretic, expectorant, inhalant, insect repellent and supportive properties (JL *et al.*, 1995; Djenane *et al.*, 2011 and Javaid *et al.*, 2012).

## **2 Materials and method**

### **2.1 Collection of plant material**

The Eucalyptus barks were collected from Jahangirnagar University campus and national botanical garden, Bangladesh. The barks were dried and crushed manually with wooden arrangement and make in powder form.

### **2.2 Extraction**

The plant materials was sun-dried first and then, dried in an oven at reduced temperature (< 70° C) to make suitable for grinding. The powdered plant materials were submerged in sufficient volume of methanol and ethanol in an air-tight flat bottomed container for seven days, with occasional shaking and stirring. The extracts were then filtered and dried on electrical water bath.

### **2.3 *In-vitro* antioxidant capacity assay**

The *in-vitro* antioxidant capacity assay of Hydrogen peroxide radical scavenging activity of the methanolic plant extract and Ascorbic Acid (standard) were done at Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh.

### **2.4 *In-vitro* antimicrobial test**

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The *in-vitro* antimicrobial tests of ethanolic extract against Azithromycin were done at Bangladesh Livestock Research Institute (BLRI), Bangladesh.

### 3 Results and discussion

Table 1 and Figure 1 represents the amount of extract needed for 50% inhibition (IC<sub>50</sub> value) of *Eucalyptus globules* was found to be 96.91µg/ml, whereas Ascorbic acid showed the value of 57.93µg/ml.

Table 1: Hydrogen peroxide radical scavenging activity of the methanolic plant extract and standard.

Concentration (µg/ml)	% Inhibition of methanol extract and standard at different concentration	
	Methanol Extract	Ascorbic acid (standard)
5	11.81 ± 0.33	19.44 ± 0.21
10	18.46 ± 0.65	26.29 ± 0.37
20	26.24 ± 0.49	33.96 ± 0.43
40	32.67 ± 0.47	41.98 ± 0.28
60	37.38 ± 0.55	52.28 ± 0.44
80	45.35 ± 0.49	59.58 ± 0.57
100	53.72 ± 0.63	68.86 ± 0.71
IC <sub>50</sub> (µg/ml)	96.91 ± 0.85	57.93 ± 0.58

The values are expressed as mean ± standard deviation (n=3).

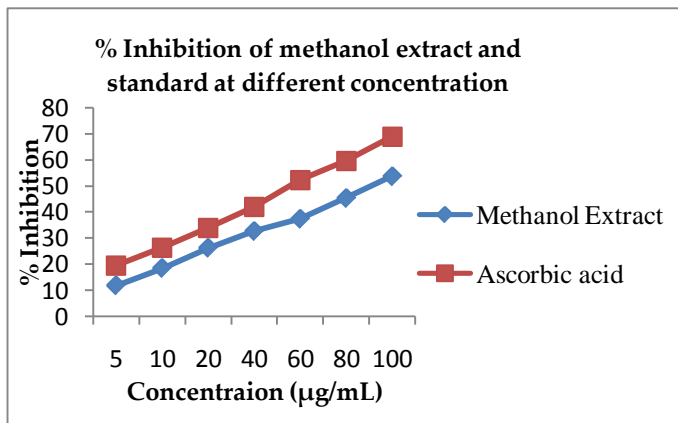


Figure 1: Inhibition percentage of methanolic extract and standard.

The extract showed notable antimicrobial activities against pathogens. The antibacterial activities of *Bacillus cereus*, *Staphylococcus aureus* and *Eshcherichia coli* were higher than *Klebsiella pneumonia* and *Pseudomonas auriginosa*. Spectrum of

antimicrobial activity of the two different varieties of *Staphylococcus aureus* and *Eshcherichia coli* were similiar. The results of this study are placed in Table 2 and shown in Figure 2. It was found that no one of the extracts had inhibitory effects on *Klebsiella pneumonia* and *Pseudomonas auriginosa*.

Table 2: Antimicrobial activities of the ethanolic extract of *Eucalyptus globules*

Sl No	Microorganism	Concentration			Azithromycin 60 µg/ml
		50 µg/ml	100 µg/ml	200 µg/ml	
1	<i>Klebsiella pneumonia</i>	No	No	No	No
2	<i>Bacillus cereus</i>	No	8.8 mm	7.11 mm	17.16 mm
3	<i>Staphylococcus aureus</i>	No	7.7 mm	8.8 mm	15.20 mm
4	<i>Pseudomonas auriginosa</i>	No	No	No	20.20 mm
5	<i>Eshcherichia coli</i>	No	7.7 mm	8.8 mm	15.16 mm

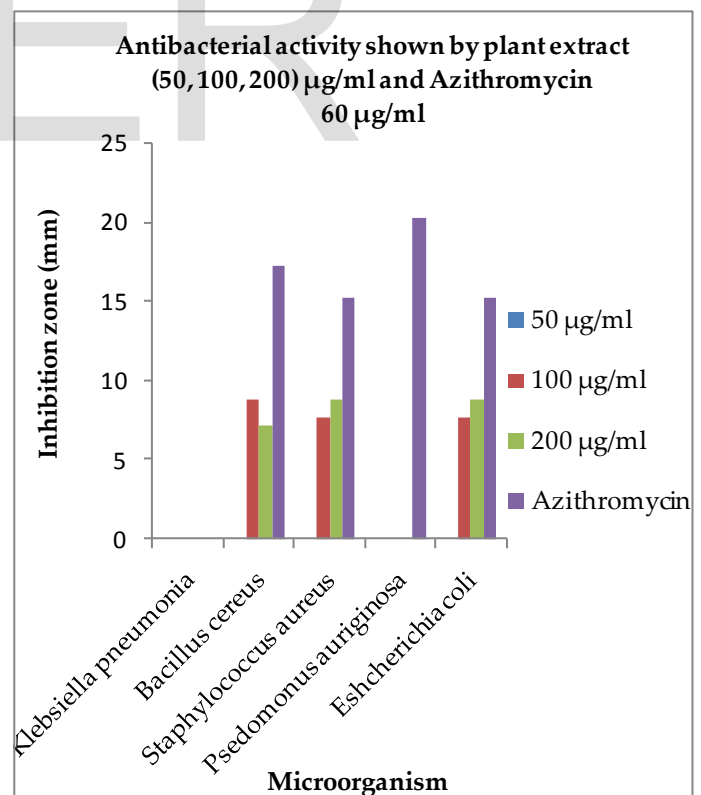


Figure 2: Antibacterial activity shown by plant extract and Azithromycin.

### Conclusion

From the above results, it can be concluded that the crude extract of *Eucalyptus globules* have both potential antioxidant and antibacterial properties. The plant could be subjected for extensive chromatographic separation and purification processes to isolate bioactive lead compounds for the discovery of new therapeutic agents.

flowers and roots of *Pyrostegia venusta*(Ker Gawl) Miers. *BMC Complement. Altern. Med.* **11**, 69.

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