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Short Communication

Antimicrobial activity of Cinnamaldehyde from Methanolic extracts of Cinnamon on *Klebsiella pneumoniae* & *Candida albicans*

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Cinnamaldehyde was extracted from cinnamon by steam distillation. The *in vitro* antimicrobial activity of Cinnamaldehyde from cinnamon bark has been evaluated against *Klebsiella pneumoniae* and *Candida albicans*. Methanolic extract of cinnamon was used. Methanol was the best solvent for Cinnamaldehyde. The inhibition zone for *Klebsiella pneumonia* was 10mm and for *Candida albicans* was 4mm. The solvent showed the zone of 3mm on *Klebsiella pneumonia* and no inhibition on *Candida albicans*. From the results it concludes that Cinnamaldehyde from Cinnamon species shows antimicrobial activity.

Key words: Cinnamaldehyde, Cinnamon, Steam Distillation, *Klebsiella pneumoniae, Candida albicans*.

Cinnamon which is used as a spice and which belongs to Lauraceae family (Meena Vangalapati *et al.,* 2012). The genus *Cinnamomum* comprises about 250 species (Sen-Sung Cheng *et al.,* 2006) that are distributed in Asia and Australia (Jayaprakasha *et al.,* 2003). Cinnamaldehyde was one of the major constituents of Cinnamon bark (Sree Satya Nandam *et al.,* 2012). Spices offer a promising alternative for food safety (Arora *et al.,* 2007). Some studies revealed that the phenolic compounds present in the spices and herbs play a vital role in their antimicrobial activities (Hara-Kudo *et al.,* 2004). By suppressing the factors that are essential for microbial growth (Brull *et al.,* 1999), we can preserve the food for some more days. Cinnamon is used as natural preservative that prevent the decomposition of products (Dorman *et al.,* 2000).

Figure 1: *Klebsiella pneumonia* on MacConkey agar plate

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Figure 2: *Candida albicans* growing on Sabouraud agar

Bark of Cinnamon was collected from a local market at Visakhapatnam, Andhra Pradesh. The bark was cleaned and dried under sunlight for 24 hr. The dried bark was powdered and used as a raw material and stored in an air tight container. Sieve the Cinnamon powder by using different particle sizes ranging from 354 to 125 microns.

Cinnamaldehyde was extracted from 80% (v/v) methanolic extract (Sree Satya *et al.,* 2012) of Cinnamon from the Steam Distillation. The final extract from steam distillation (Sree Satya *et al.,* 2012) was collected and purified with hexane in 1:1 ratio. The purified sample of Cinnamaldehyde was used to identify the antimicrobial activity.

Antimicrobial activity of Cinnamaldehyde was investigated against *Klebsiella pneumoniae* and *Candida albicans*. Nutrient agar broth was used to investigate the antimicrobial activity of Cinnamaldehyde from methanolic extract of Cinnamon species.

The *in vitro* antifungal activity of the test sample was carried out by agar well diffusion method. Fresh bacterial (The same process is used for both organisms *Klebsiella pneumoniae* and *Candida albicans*) culture of 0.1ml having 10^8 CFU (Colony Forming Units) was spread on nutrient agar plate with glass spreader. A well of 6mm diameter was punched off into agar medium with sterile cork borer and filled with 50µl of the methanolic extract of cinnamon by using micro pipette in each well in aseptic condition. Plates were then kept in a refrigerator to allow pre-diffusion of extract for 30 minutes and further incubated in an incubator at 37^0C for 24hrs. The antibacterial activity was evaluated by measuring the zone of inhibition. The solvent used for extraction was also kept as control. Diameter of the inhibition zone was calculated.

Researchers in different parts of the world have studied the antimicrobial activities of indigenous herbs and spices for over a century. Zaika (Zaika 1975) has reviewed the antimicrobial effectiveness of spices and herbs. Recent results of one Indian study (De *et al.,* 1999) indicated that cinnamon have potent antimicrobial activity.

In the present study, the inhibition zone for *Klebsiella pneumonia* (El-Baroty *et al.,* 2010) was found to be 10mm and for *Candida albicans* was 4mm. The solvent showed the zone of 3mm on *Klebsiella pneumonia* and no inhibition on *Candida albicans*. The results showed that antimicrobial activity was positive for *Klebsiella pneumonia* and it was negligible effect on *Candida albicans*.

Table: Zone of Inhibition (mm) against *Klebsiella pneumonia* and *Candida albicans.*

Sl.No	Family	Species	zone Inhibition (mm)
1.	*Enterobacteriaceae*	*Klebsiella pneumonia*	10
2.	*saccharomycetaceae*	*Candida albicans*	04

In the present study, the inhibition zone for *Klebsiella pneumonia* was found to be 10mm and for *Candida albicans* was 4mm. The solvent showed the zone of 3mm on *Klebsiella pneumonia* and no inhibition on *Candida albicans*. The results showed that antimicrobial activity was positive for *Klebsiella pneumonia* and it was negligible effect on *Candida albicans*. From the results it concludes that Cinnamaldehyde from Cinnamon species shows antimicrobial activity.

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