

Antibacterial action of spices and herbs against pathogenic *Escherichia coli*

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Our ancestors used to include herbs and spices as flavouring agents in food and food items which were later perceived as appetizers, carminatives etc. The use of herbs and spices is gaining popularity throughout the developed world, as people strive to stay healthy in the face of chronic stress and pollution. Herbal medicine often complements all forms of conventional treatments. Various plants extract possess bacteriostatic and bactericidal effects and most of these plants contain many active compounds which have inhibitory effect towards bacterial strains as well as fungi and yeast [5]. In general, herbs provide the starting material for isolation or synthesis of conventional drugs. Therefore, this study was conducted to evaluate the antibacterial activity of herbs and spices against *Escherichia coli* by disc diffusion method.

Mother tincture was collected from Homeopathic shop, Ajmer. The bacterial cultures (*E. coli*) were multiplied by culturing on EMB (Eosin Methylene Blue) agar medium having pH 7.2 at 37°C, collected from Microbiology Laboratory Jawahar Lal Nehru Medical Collage, Ajmer. The 24 hr cultures of bacterial growth in EMB medium were transferred into 5 ml of brain heart infusion (BHI) broth pH 7.6. After incubation at 37°C for 24 hr, the broth was centrifuged at 3000 rpm for 15 min., washed and suspended in distilled water and turbidity was adjusted to standard (10^8

CFU/ml⁻¹). Thereafter, cell suspension was diluted to concentration of 10^7 CFU/ml.

The disc diffusion method was used as described by Jorgensen *et al.* [3] and Nevas *et al.* [7].

The antibacterial activity of all extracts were tested against the growth of gram negative bacteria, strain *Escherichia coli*. The tested inoculums were flooded into respective medium by spread plate method (10^7 CFU/ml). After solidification sterile 6 mm filter paper discs were immersed in crude extract of coriander, cumin, fenugreek, ginger, turmeric, neem, mulethi, arjuna, psoralea, ashwgandha, boerhavia, brahmi, dimethyl sulphoxide (DMSO), amoxycillin and were placed on test organism-seeded plates. To test the effectiveness of medicinal herbs and spices against *E-coli*, Dimethyl sulphoxide used as negative control and amoxycillin used as positive control. The plates were incubated at 37°C for 24, 48 and 72 hr. Diameter of inhibition zones were measured after 24, 48 and 72 hr in each of the twelve treatments [4] (Table 1).

Results of disc diffusion test showed that amoxycillin inhibited *E. coli* at highest degree and made the inhibition zone of 14 mm diameter. No inhibition zone was made by DMSO. Among the extracts of medicinal herbs, arjuna showed highest inhibition zone (diameter 12.8 mm), whereas mulethi showed lowest inhibition zone (diameter

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Table 1. Antibacterial activity of mother tincture of some medicinal and spices plant against *E.coli*

Mother tincture	Zone of inhibition (mm)		
	24 hr	48 hr	72 hr
10% DMSO	0.0	0.0	0.0
Amoxycillin	14.0	15.2	17.0
Neem	4.5	4.6	4.3
Mulethi	0.4	0.3	0.3
Arjuna	12.8	12.9	13.1
Psoralea	8.5	8.9	8.8
Ashwaganda	9.1	9.0	9.2
Boerhavia	9.8	9.6	9.8
Bhrami	10.2	11.1	11.1
Coriander	2.1	8.2	10.0
Cumin	9.1	10.2	11.0
Ginger	6.0	8.0	9.0
Turmeric	0.3	0.4	0.5
Fenugreek	7.0	10.0	14.0

Data are means of three readings

0.4 mm) against *E. coli* and among spices, cumin showed highest inhibition zone (diameter 9.1 mm) and turmeric showed lowest inhibition zone (diameter 0.3 mm) against *E.coli* at 24 hr of incubation (Fig. 1). The percentage of all extracts in comparisons to positive control of amoxycillin, from highest to lower order is as follows; arjuna > brahmi > fenugreek > cumin > boerhavia > ashwagandha > psoralea > ginger > coriander > neem > turmeric > mulethi.

This study showed that herbs and spices could inhibit certain food-borne diseases. Most of the essential oils contain anti-bacterial properties as reported by Aishwath and Tarafdar [1]. Antibacterial properties of garlic, herbs and spices extract was also found effective against *E. coli* and other pathogenic bacteria [2, 6]. The results clearly indicate that extracts of herbs and spices can be used as natural antibacterial compounds which has the potential to prevent many common diseases.

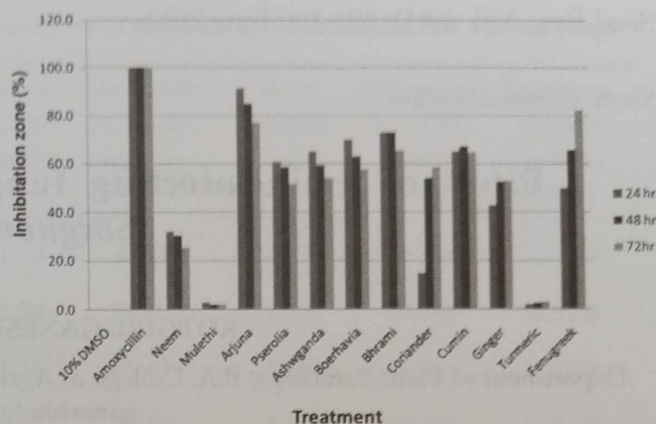


Fig. 1. Per cent inhibition zone of Mother tincture against *E. coli* in comparison to positive control amoxycillin

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