In-Vitro Antibacterial Activity of Bunium Persicum and Mentha Longifolia against Bacillus Subtilis and Staphylococcus Aureus

Ghderi PGhderi P*, Ahmadi R, Balkanyian F, Moridikyia A, Mahdavi E, and Tavakoli P

Abstract—There are considerable studies indicating that herbal extracts have antibacterial effects. The aim of this study was to determine the in vitro antibacterial activity of hydroalcoholic solution of Bunium persicum and Mentha longifolia extracts against Bacillus subtilis and Staphylococcus aureus. Bunium persicum and Mantha longifolia extracts were assayed for antibacterial activity by agar well diffusion and agar dilution methods in order to determine the zone diameter of inhibition compared with tetracycline zone diameter as control. The extracts showed antibacterial activity against Bacillus subtilis and Staphylococcus aureus. The results indicate the antibacterial use of the studied plants for the treatment of Bacillus subtilis and Staphylococcus aureus infection.

Keywords—Antibacterial activity, Bunium persicum, Mentha longifolia, Bacillus subtilis, Staphylococcus aureus.

I. INTRODUCTION

Staphylococcus Aureus is a bacterium that is a member of the Firmicutes, and is frequently found in the human respiratory tract and on the skin. S. aureus can survive from hours to weeks, or even months, on dry environmental surfaces, depending on strain [1]. S. aureus infection is a worldwide problem in clinical medicine [2].

Bacillus subtilis is the best-characterized member of the Gram-positive bacteria [3]. Ubiquitous in nature, Bacillus includes both free-living (non-parasitic) and parasitic pathogenic species. Under stressful environmental conditions, the bacteria can produce oval endospores that can stay dormant for extended periods [4].

On the other hand, the plant genus Mentha belongs to the family Lamiaceae (Labiatae), and consists of about 25-30 species, most of which are found in temperate regions of Eurasia, Australia and South Africa [5]. The oils of Mentha longifolia are known to contain numerous monoterpenoids with piperitone oxide, piperitone, pipertienone, pulegone, d-limonene, carvone, menthone, β-caryophyllene, 1,8-Cineole, and menthol as dominating compounds; however, a chemogeographical variation has been observed in essential oil composition of this species [6]. Mentha longifolia (mint) was originally used as a medicinal herb to treat stomach ache and chest pains, and it is commonly used in the form of tea as a home remedy to help alleviate stomach pain. Mint tea is a diuretic [7],[8] substance. However, various biological activities for some species of Mentha have been reported including antibacterial [6],[9], antifungal [10], and insecticidal properties [11]-[13]. Bunium persicum is a plant species in the family Apiaceae formerly included in genus Carum. It is related to cumin (Cuminum cyminum). The closely related species Bunium bulbocastanum, which is used as a spice and as a vegetable, and commonly called great pignut, black zira, or earthnut, was formerly considered to be a synonym of B. persicum [14].

In our study, we investigated the in vitro antibacterial activity of Bunium persicum, Mentha longifolia extract against Bacillus subtilis and Staphylococcus aureus.

II. MATERIAL AND METHODS

Adult male Wistar rats weighting 200±30g were purchased and raised in our colony from an original stock of Pasteur institute (Tehran, Iran). The temperature was at 23±2 °C and animals kept under a schedule of 12h light: 12h darkness with free access to water and standard laboratory chow.

The plant materials used in this study consisted of Bunium persicum and Mantha longifolia extract. The fully dried plant materials were ground into fine powder, and stored in a sterile glass bottle at room temperature. 20% ethanolic solution of the extracts were prepared and used in our study.

Antibacterial activity was determined by agar well diffusion method. Sterile Mueller-Hinton agar plates (30 ml per plate) were prepared. Three wells (each of 6 mm diameter) were bored on the surface of the agar media on each plate. 20 μl of
each extract was dropped into each appropriately labelled well. Tetracycline (20 μg/disc) was used as the control. The inoculated plates were allowed to stand at room temperature for 45 min to allow the diffusion of the extracts into the agar to proceed before growth of the organism commenced. The plates were incubated at 35°C for 24 h. The assessment of antibacterial activity was based on measurement of the zone diameter of the inhibition (ZDI) formed around the well. The ZDI of extracts were compared to tetracycline zone diameter of the inhibition.

III. RESULTS

The extracts showed antibacterial activity against Bacillus subtilis and Staphylococcus aureus. Zone diameter of the inhibition of Bunium persicum extract was more than the zone diameter of the inhibition of tetracycline, however, zone diameter of the inhibition of Bunium persicum extract was less than the zone diameter of the inhibition of tetracycline. The antibacterial activity of extracts was more against Bacillus subtilis than Staphylococcus aureus.

IV. DISCUSSION

The results of current research show that hydroalcoholic solution of Bunium persicum and Mentha longifolia extract has antibacterial activity against Bacillus subtilis and Staphylococcus aureus. In accordance with our findings, there are studies showing that Mentha extract (Mentha L. and Viridis) has antimicrobial effect [15]. Research show that the isolation of an anticyemetic, diaphoretic, antispasmodic, analgesic, stimulant, and liver complaints, due to their anti-inflammatory, carminative, folk remedies for treatment of flatulence, anorexia, ulcerative colitis [17]. Studies show that, various species of Mentha have been used as has great potential of antimicrobial activity against bacteria and yeasts [17]. Studies show that, various species of Mentha have been used as folk remedies for treatment of flatulence, anorexia, ulcerative colitis and liver complaints, due to their anti-inflammatory, carminative, antiemetic, diaphoretic, antispasmodic, analgesic, stimulant, and liver complaints, due to their anti-inflammatory, carminative, folk remedies for treatment of flatulence, anorexia, ulcerative colitis [17]. Studies show that, various species of Mentha have been used as has great potential of antimicrobial activity against bacteria and yeasts [17]. Also, the essential oil of Mentha longifolia ssp. has great potential of antimicrobial activity against bacteria and yeasts [17].

Studies show that, various species of Mentha have been used as folk remedies for treatment of flatulence, anorexia, ulcerative colitis and liver complaints, due to their anti-inflammatory, carminative, antiemetic, diaphoretic, antispasmodic, analgesic, stimulant, and liver complaints, due to their anti-inflammatory, carminative, folk remedies for treatment of flatulence, anorexia, ulcerative colitis [17]. Studies show that, various species of Mentha have been used as has great potential of antimicrobial activity against bacteria and yeasts [17].

V. CONCLUSION

We have shown that Bunium persicum and Mentha longifolia extract has antibacterial activity against Bacillus subtilis and Staphylococcus aureus. The results indicate the antibacterial use of the studied plants for the treatment of Bacillus subtilis and Staphylococcus aureus infection.

ACKNOWLEDGMENT

We appreciate all who helped us to exert the present study.

REFERENCES


Parvin Ghaderi (corresponding author) is with Persian Medicine and Pharmacy Research Center, Faculty of Traditional Medicine, Tehran University of Medical Sciences, Tehran, Iran.