In vitro Antibacterial Activity of Foeniculum vulgare Seed Extract

Khan NT*
Department of Biotechnology, Balochistan University of Information Technology Engineering and Management Sciences (BUITEMS), Quetta, Pakistan

Abstract

Foeniculum vulgare (Apiaceae) is a popular plant with valuable medicinal and culinary importance. It is mostly used in the treatment of ailments associated with digestive and respiratory systems. Besides its fruit are dry seeds which is used as flavoring agent for meat, fish and beverages. Phytoconstituents of F. vulgare seed extracts such as phenols and aromatic derivatives possess different physiochemical properties including competence to inhibit the growth of certain bacteria. Thus this study was conducted to determine the antibacterial property of Foeniculum vulgare seed extract against a variety of pathogenic bacteria.

Keywords: Anti-bacterial; Foeniculum vulgare; Phytoconstituents

Introduction

Foeniculum vulgare is a periodic herb with potent medicinal importance belonging to the family Umbelliferae (Apiaceae). In English it is known by the name of Fennel, Fenouil in French, Shmir (Razianaj) in Arabic and Razianeh in Persian. It is an herbaceous and aromatic plant, with a height of 1 to 2 m, grows in many parts of Europe, the Mediterranean, and Asia. Fennel is a perennial herb with stems grooved, intermittent leaves, often combined with dark green, fluffy with a blade divided into thin pieces, petiole with sheath; flowers are usually bisexual, regular or irregular, with yellow umbrella in the form of oval beads [1,2]. Fennel has small seed with a length of about 8 mm and a width of 3 mm with an aromatic odor and sweet taste. Fennel seeds are narrow, long, cylindrical appearance and dimensions vary depending on plant growth. The crack groove light green surface [3,4]. The water content of fennel seed is 6.3% water, fat 10%, protein 9.5%, minerals 13.4%, fibers 18.5% and carbohydrates 42.3% [5,6]. The oil extracted from Foeniculum vulgare seeds showed the capability to inhibit bacterial growth including Escherichia coli, Bacillus megaterium and Staphylococcus aureus [7], Listeria monocytogenes and S. aureus [8,9]. Its alcoholic and aqueous extracts are known to effect towards Campylobacter jejuni and Helicobacter pylori [10]. It was revealed in another study that Foeniculum vulgare seed extracts also inhibits the growth of multidrug resistant bacteria such as Acinetobacter baumannii. The aromatic secondary metabolites present in these extracts were mainly responsible for this activity [11]. The main purpose of this study was to evaluate the antibacterial activity of Foeniculum vulgare against a number of disease causing bacteria.

Materials and Methods

Plant extraction

100 g of dried Foeniculum vulgare seeds were bought from a local shop in satellite town Quetta and milled to form a course powder and then extracted with methanol (500 ml). The aqueous extract was prepared by boiling 10 g of dried ground seed in 20 ml distilled water for 2 h.

Antibacterial activity evaluation by disc diffusion assay

Antibacterial activity of aqueous and methanolic extract was individually tested against a number of pathogenic bacteria by disc diffusion method. Using 1 cm sterilized discs prepared from Whatman’s filter paper no.1, impregnated with alcoholic and aqueous seed extracts on nutrient agar incubated for 48 hrs at 37°C. Test species of bacteria includes Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Bacillus cereus, Bacillus pumilus, Bacillus megaterium, Shigella dysenteriae, Shigella shiga, Salmonella typhi, Shigella boydii, Micrococcus luteus, Pseudomonos pupida, Pseudomonos syringae, Salmonella typhimurium, Shigella dysenteriae, Staphylococcus albus, Streptococcus haemolyticus and Agrobacterium tumefaciens. Presence or absence of inhibition zone around the impregnated discs indicated the antibacterial property of the extracts. Nutrient agar plates with discs impregnated with autoclaved distilled water was taken as control in all experiments.

Results

Foeniculum vulgare seed extracts were evaluated for their antibacterial activity (Table 1).

Discussion

The antifungal activity of different Foeniculum vulgare seed extracts expressed as the presence or absence of inhibition zone was summarized in Table 1. Methanolic extract of Foeniculum vulgare seed extracts showed activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli, and Klebsiella pneumoniae but no activity against Pseudomonos aeruginosa, Bacillus cereus, Bacillus pumilus, Bacillus megaterium, Shigella dysenteriae, Shigella shiga, Salmonella typhi, Shigella boydii, Micrococcus luteus, Pseudomonos pupida, Pseudomonos syringae, Salmonella typhimurium, Shigella dysenteriae, Staphylococcus albus, Streptococcus haemolyticus and Agrobacterium tumefaciens. However its aqueous extract found to be more effective in terms of its antibacterial activity. As the obtained result clearly revealed that aqueous extract inhibited the growth of a number of bacterial species such as Pseudomonos pupida, Pseudomonos syringae, Shigella dysenteriae, Staphylococcus albus, Streptococcus haemolyticus, Staphylococcus aureus, Bacillus subtilis, Bacillus pumilus, Bacillus
phenolic compounds are considered as the most important and most active compounds of it. The fennel bioactive molecules can be used for different drug production and for the synthesis of antimicrobial agents.

**References**

1. Pourrabbs S, Kesmati M, Rasekh A (2011) Study of the the anxiolytic effects of fennel and possible roles of both gabaergic system and estrogen receptors in these effects in adult female rat. Physiol Pharmacol 15: 134-143.


