

**Detection the biological activity of aqueous extract of Shamar  
plant seeds *Foeniculum vulgare* Mill**  
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### Abstract

Unfortunately, many type of chemical drugs approved their unsafely, after period of use, it has been withdrawn from markets. Otherwise, herbal medicine wide spread in using and application, with some modification if it's necessary. Shamar herbs *Foeniculum vulgare* Mill, is a herbaceous plant of the family Umbelliflorae, native to the Mediterranean, have a WHO recommendation, is a main component of many manufactured drugs in pediatrics. It is commonly known as fennel has been in medicine as analgesic, digestive, diuretic, lactigenous, anti-inflammatory, anti-- spasmotic agent. Crude extract for the verification of biological activity was prepared from seeds bought in the markets. The antimicrobial activity was determined by paper disc diffusion test and minimum inhibitory concentration MIC. The tested microorganisms were clinical isolates obtained from bacteriology sector of Al- Samawa hospital for women and children, it had been evaluated its biological activity in 3 different model of microorganism (*E. coli*, *Klebsiella* spp. and *Pseudomonas* spp.). Results of evaluation approved the biological activity of *Foeniculum vulgare* Mill as bactericide effect. The MIC show quantity and quality effects of fennel on the Microorganism model, The Coliform inhibited by the lower concentrations gradient, *Klebsiella* spp. had affected by higher doses, while, the *Pseudomonas* spp. did not show any change for all concentrations gradient. Therefore, shamar (Fennel) extract had a pharmacological character in treat many GIT, respiratory infection, in addition to its favor effect in nursing and lactation.

**Key words:** Fennel; Antimicrobial activity; *Foeniculum vulgare*

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### Introduction

Health workers and medical institutions increased their intentions for using the ancient medicine and Natural products, to treat variety of common diseases. Chemical drugs used since 50s of last century, but the plant and herbaceous drugs had used in treating over centuries of human being life. Natural products approve its activity, it's because no side effects in living

tissues [1]. Unfortunately, many type of chemical drugs showed their unsafely, after a period, it had been withdrawn from markets. Otherwise, Natural products drugs are wide spread in using and application with some modification if it's necessary [2].

Herbal medicine and natural products, is the science of using herbs and plants parts as leaves, roots, even the stems in treatment the diseases. The ancient Chinese, Egyptians, and Babylonian had developed many methods of treatments by using herbs and plants leaves. The using of herbal oil had been introduced to ancient's kings and pharaoh as special favor drinks, rather than its treatment and antioxidants characterizations. Recently, scientific researchers had been developing the drugs extractions methods, started by dehydration, hot water and cold water extractions, then alcoholic extractions, their works proceed to detect the active substances in medical plants [1]. Separation, extraction, and identification of most active chemical compounds in medical plants is the heart of many scientific research in pharmacy. However, the amazing progress in identification technology of compound adds qualitative resources in herbs, like using of UV, IR spectrum in detection [3].

Herb of Shamar (fennel) *Foeniculum vulgare* Mill is one of Umbelliflorea order, of Dicotyledonae Class, in the Genus call Anthum. The most height the herb reach is about 1-2m; many stems with threads leaves; its color about blue. The flowers of herb are yellowish with elongated small seeds started yellow to grayish in color, see Fig.1.

Well known compounds of *Foeniculum vulgare* mill. is a Fenchone oil, which responsible of the medical effect of the shamar herbs, in addition to alfa oil, phellandrine oil, and lemonine. The Anethole substance was found in 60% in shamar herbs seeds, compared with 20% fenchone; there are a trace amounts of comphene and phelandrine [4]. Shamar (fennel) contains minor amounts of polyacetylenes in non-polar extracts, which shows cytotoxicity against five different lymphoblastic cell line [5].



**Figure1.**

Illustrate the whole appearance and details of flowers and fruits.

The shamar (fennel) has many medical characteristics; it has been used as analgesic, digestive, diuretic, lactigenous, anti-inflammatory, anti-spasmodic agent. Its good with unison to treat the abdominal gases in pediatrics as Grab water. It has approved to treat chest inflammation, asthma, and bronchitis. It's widely used in England to treat the synovitis and joints pain. Enhancing the lactation and milk production in women due to its erogenous effects, therefore they prevent it at pregnancy. Herb is described as diuretic agents companied to other drugs. It used for heart beat increasing and arterial blood pressure treatment. Shamar seeds are eaten raw, sometimes, with some sweetener to improve eyesight [6].

The medical active oil of *Foeniculum vulgare* is the seeds extract oil by the hot water extraction, the extraction oils of the stems and leaves are less effective than seeds, and used in food manufacturing. The specific density of *Foeniculum vulgare* oil at 10 C is 0.948. It dissolved in 1-4 volume of alcohol 85% [7]. Shamar (Fennel) has been reported to contain 6.3% of moisture, 9.5% proteins, 10% fat, 13.4% minerals, 18.5 fiber, and 42,3% carbohydrate. The minerals and vitamins present in *F. vulgare* are calicium, potassium, sodium, iron, phosphorous, thiamine, riboflavin, niacin and vitamine C [8].

In favor of using the herbs instead of chemical substances; and to decrease the negative suppressors of human health, our research aims to use the natural products that widely used in popular. The present study evaluates the efficacy of shamar extracts as an agent with antimicrobial activity in clinical isolates of microorganism. The study of *Foeniculum vulgare* Mill. is a considerably forward step to minimize the dependence on chemical products in treatment the widely spread seasonal diseases.

## Methods

Soxholt for extraction, autoclave, incubator, hode and Millipore filter unite and some glass plates for culture media have been used. 50 gm of shamar (fennel) seeds have bought in the market. Distal water, Ethanol, and culture media had gained from well-known world companies, the culture media were Mullar-Hinton agar, and Nutrient broth) prepared by the standard way as its labeled in the leaflet, without any modification. The tested microorganisms were clinical isolates obtained from bacteriology sector of Al- Samawa hospital for women and children, it had been evaluated its biological activity in 3 different model of microorganism (*E. coli*, *Klepsiella spp.* & *Pseudomonas spp.*).

- Preparation of hot water shamar extract: extracts were prepared by soxhelt apparatus for 10 hours according to the Association of official Analytical Chemists (AOAC,

1970) procedure using hot water as a solvent fifty grams of dried sample were poured into 450 ml of water.

- Concentrations Gradients: it had prepared many concentrations from crude oil of *Foeniculum vulgare* mill. extract, by taking 25 ml of crude extract and complete the volume up to 100 ml, to get the concentration of 25%, at the same method we prepared the other concentrations 50%, 75% and 100%.
- Preserving method of extraction within its filter paper had been done by putting in the sealed test tube and covered with aluminum at refrigerator in 4C. The heat given to the solvent was just to evaporate slowly the crude extract filtered by white-man No.1 filter paper, then was incubated at 37C for 48 hours at room to dry.
- The medium of test and cultivation of microorganism was typical for wide variety of bacteria, in order to eliminate the differences in density and quality of culture media. The medium of test is Mullar-hinton agar prepared by the standard way as it's labeled in the leaflet, without any modification. Autoclaved and poured in clean glass plates and incubated for 48 hours.
- Biological activity measurements were performed by inoculating & spreading the bacteria over the agars, then making holes in 4 corners of glass plates. Injected a suitable amount (0.1 ml) of all concentrations in each plate of all types of clinical isolates bacteria. Incubated at 37C for 48 hours. The biological activity has been detected by using the minimum inhibition zone MIC [9, 10].

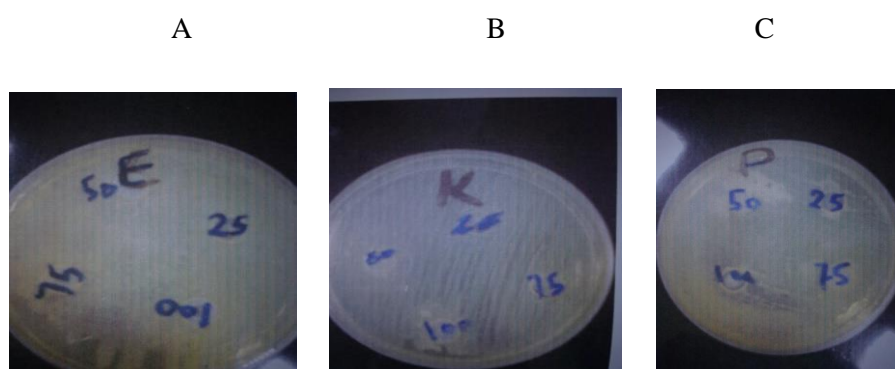
## Results

In this study shamar (fennel) extracts was chosen to determine their antimicrobial activity due to their bioactive components which have been the ability to reduce the risk of inflammation and seasonal diseases through their antimicrobial, antioxidant, anti-inflammatory activity and scavenge the free radicals. Aqueous and organic extracts of *F. vulgare* have been reported to show antibacterial activity against some bacterial strains [11]. The shamar essential oil has been reported to exhibit antifungal effect [1]. Table 1 show the biological activity of shamar *F. vulgare* in three different types of clinical isolates of bacteria, through the measurement of MIC.

**Table 1.**

Illustrate the types of clinical isolates bacteria and its biological activity throughout treating by different concentration of crude *F. vulgare* oil extract.

Bacteria	25% conc.	50% conc.	75% conc.	100% conc.
<i>E. coli</i>	0.6	Not active	Not active	Not active
<i>Klebsiella spp.</i>	Not active	0.3	0.5	0.8
<i>Pseudomonas spp.</i>	Not active	Not active	Not active	Not active

**Figure 1.**

Illustrate the MIC in plates. The biological activity of *F. vulgare* in A: *E. coli*, B: *Klebsiella spp.* C: *Pseudomonas spp.*

## Discussion

China and India were the famous countries in using the herbs medicine, their work still going on in the same pattern, due to high expensive of manufactured drugs in poor communities. The successful communities have inherited a good amount of information to keep themselves a life at high percentage, therefore their knowledge about life and diseases sometimes is more than sciences of institutions and experts or scientific books. The main difficulties in collecting the popular medicine or natural products use is the nouns or terms of these medical used herbs or plants in many languages. In some countries the Latin taxonomy was not applied for many products and herbs, they known it by local nouns which is not understandable by the foreign researchers. It is important to repeat the work in all the environment and communities and record the small details, which may add a new progress in treating of diseases, and record all the local names of medical plants beside its scientific nouns [4-10].

The data of our experiments describe that the biological activity of herb depend on quantity and quality of herb concentration and the type of microorganism which had been utilize in

experiment. Table 1. Illustrate that the concentration of extract play district role in biological activity. Its exhibit the *E. coli* responded only to lower concentration 25% of extract. It is because the motility character of this type of bacteria, gas producing by glucose fermentation, which limit the effect of extract in the *E. coli*. The phenomena of cell wall shrinkage and colonies protection at higher concentration was the main cause of abolition the effect in *E. coli* at higher concentration above the 25%, the only conc. had recorded a response to extract. Fig. 2 A [2]. The low concentration does not show any activity in media cultivated with *Klebsiella* spp. but it exhibit a huge MIC in higher concentration gradients Fig.1. B., It may be to interactions of these substances to capsule formation which is the main character of *Klebsiella* spp., or because the lack of motility, which was obligate the bacteria colonies to face the extract active substances. [2].

The selectivity in biological activity was found in *F. vulgare* to some species of bacteria rather than other species, the clinical isolates of *Pseudomonas* spp. did not show any activity to all concentration of herb extracts; it may be due to characteristics of the *Pseudomonas* of diffusing in to the agar which effected the results. Therefore, it has been recommended a deep hole to *Pseudomonas* spp. in order to make sure of biological activity of many type of extracts [2].

The researchers have been reported that oral administration (200 mg/kg) of *F. vulgare* fruit methanolic extract exhibited inhibitory effects of shamar against acute and subacute inflammatory diseases [6, 11-15]. Shamar has been reported to show antimicrobial properties of the essential oil [1]. In conclusion, this herb extract has a pharmacological character in treating GIT, respiratory infections especially in infants, in addition to its favor effect in nursing and lactation enhancement.

### Competing interests

The author declares that there is no conflict of interest.

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