

## Antimicrobial Effects of *Quercusinfectoria*, *Matricariachmomilla* Extracts, and Alum Against Bacteria Isolated from Woman with Sever Vaginitis

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### Abstract

Plant extracts considered as natural, safe, accessible and inexpensive materials has been grown for the treatment of bacterial infections. This work was carried out to decide the inhibitory activities of *Quercusinfectoria*, *Matricariachmomilla* and Alum on bacterial vaginitis and vaginal yeast infections.

*In vitro* antimicrobial activity of *Quercusinfectoria*, *Matricariachmomilla* and chemical material Alum were studied against *Staphylococcus aureus*, *Streptococcus agalactiae*, *Enterobacter spp.*, *E. coli*, and *Candida albicans*. The inhibitory effects of extracts were compared with standard antibiotic ciprofloxacin.

The mean of inhibition zones that obtained from these extracts were range from (20-35mm). This study illustrates that the aquatic extracts of these materials can be used as a potential source of unusual antimicrobial agents used for bacterial vaginosis and vaginal yeast infection. Also, bacterial infections were the highest responsive to plant extracts rather than yeast infection, especially *Strep agalactiae*.

**Keywords:** bacterial vaginosis, *Quercusinfectoria*, *Matricariachmomilla*, and chemical material alum.

### Introduction

Vaginal ecosystem is an ecologic niche in which microorganism, physical characteristics (pH, mucus viscosity, etc) and biochemical processes are in balance (1). Bacterial and vaginal yeast infection caused by excessive

growth of bacteria and vaginal yeast infection. This is caused by an imbalance of naturally occurring bacteria in the vagina. The normally dominant species of lactobacilli markedly reduced (2).

Candida are normally present in the vagina in small numbers, the excessive growth of candida lead to vaginal yeast infection (3). The number of infected cases caused by either the new, re-emerging, or by pathogens resistant to drugs are developing gradually day by day, and the increased section of the hospitalized patients especially those who are immunocompromised has resulted in an increase of invasive and severe infection (4). Drugs derived from plants remain an essential store of medicines, especially in the developing nations, in order to fight serious and severe infectious diseases. Nearly 60 to 80% of the world's population till our days using the traditional remedies and medicines for the treatment of common illnesses (5,6).

Usage of plants and their products have an extended history which started with general medicine and continue through years, to be incorporated into allopathic and traditional medicine and treatment. From ancient times, many types of plants species that have different pharmacological activities and properties, where they are known to retain several secondary metabolites as conveyed to tannins, terpenes, flavonoids, alkaloids, glycosides, saponins and steroids which are therefore should be employed in order to fight the disease causing different severe pathogens (7,8,9,10, 11).

This work aimed to estimate the effects and activity of some plant extracts against bacterial and yeast vagina infection.

## MATERIALS AND METHODS

### Collection of Plants

Extracts of *Quercus infectoria*, *Matricaria chamomilla* and chemical material allum) were prepared in aquatic form. About 50 gram of these plants were soaked in 100 ml of distilled water, and allowed to stand for 72 hours, then were sterilized by filtration (using 0.45 Millipore filter). These prepared extracts were considered as the 50% concentration of each extract (12).

Fresh plants were collected from a food store, then, were cleaned, peeled and sun dried; they were powdered using an electric blender and placed in a clean container.

### Microorganism Collection

Clinical isolates were obtained from woman with genital pruritus and burning sensation. The bacterial isolates represented by; *Staph. aureus*, *Strept. agalactiae*, *E. coli*, *Enterobacter spp.* and *Candida albicans*.

These isolates were identified and confirmed by the use of conventional and traditional biochemical tests and Api system (Biomeraux, France) (13), then after were cultivated in pure cultures, at microbiological lab at the College of Medicine in University of Babylon.

### Agar Well Diffusion Assay for Testing the *In vitro* Antibacterial Activity, NCCLS (14)

From each bacterial isolates pure culture a loop full growths were inoculated into nutrient

broth and incubated at temperature of 37°C for time of 18-24 hours. Then the prepared bacterial suspensions were diluted with normal saline. The turbidity of suspensions were adjusted and compared with 0.5 McFarland standard tube to yield a uniform suspension containing  $1.5 \times 10^6$  CFU / ml. Later on, entire Mueller Hinton agar plates surfaces (for all tested bacteria) were streaked by a cotton swab after it was dipped in the suspension of each suspension and plates were left for 5-15 minutes at room temperature to be dried. Four wells of about (5mm in diameter) were made in the media using a cork borer and add about 20µl of each plant extracts solutions or Alum in the wells. Incubate plates at 37°C for overnight. After 24 h of incubation, each zone of inhibition was noted for all extracts and all isolates. The diameters of the zone of inhibitions were measured by measuring scale in millimeter (mm) (15, 16, 17).

## Result

Medical plant were identified for the effective antibacterial and anti-infection properties in vaginosis. The agar diffusion of aqueous extract from plant extracts (*Quercus infectoria*, *Matricaria chamomilla* and chemical material alum) against *Staph. aureus*, *Strept. agalactiae*, *E. coli*, *Enterobacter spp.* and *Candida albicans*.

The *Matricaria chamomilla* showed large inhibition zone against *Strep. agalactiae*, *Staph. aureus*, followed by *E. coli*. The same inhibition zone for *Enterobacter spp.*, *Candida albicans*, as in Figure (1).

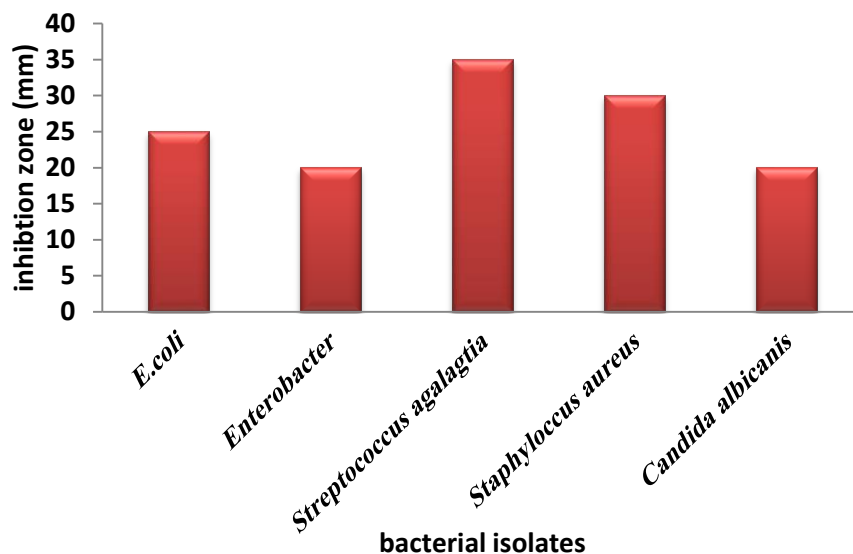
The aqueous extract of *Quercus infectoria* gave inhibition for *Strep. agalactiae*, *E. coli*, *Staph. aureus*, and *Enterobacter spp.* and *Candida albicans*, as in Figure (2).

The chemical material Alum had a great potential activity against all the bacterial vaginosis and Vaginal yeast infection which illustrated by the figure (3), which appeared that inhibition zone range from 25-38 mm.

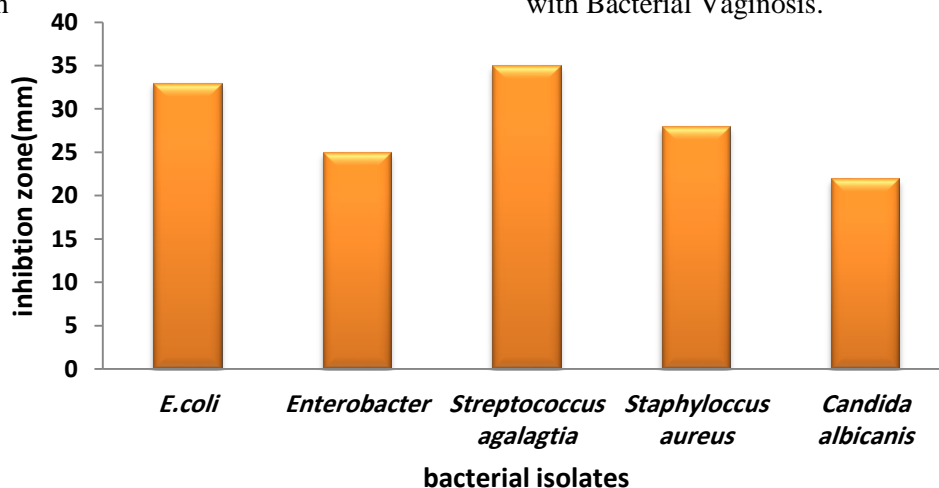
From all these figures *Strep. agalactiae* was more responsive to the plant extracts. Also, response of bacterial infection to plant extracts was greater than response of yeast infection.

The figure (4) of antibiotic ciprofloxacin showed that inhibition zone for *Strep. agalactiae* 18 mm, *E. coli* appeared inhibition zone 17mm, *Staph. aureus* 15 mm, *Enterobacter spp.* 14 mm, while *Candida albicans* performed less than 1mm inhibition zone.

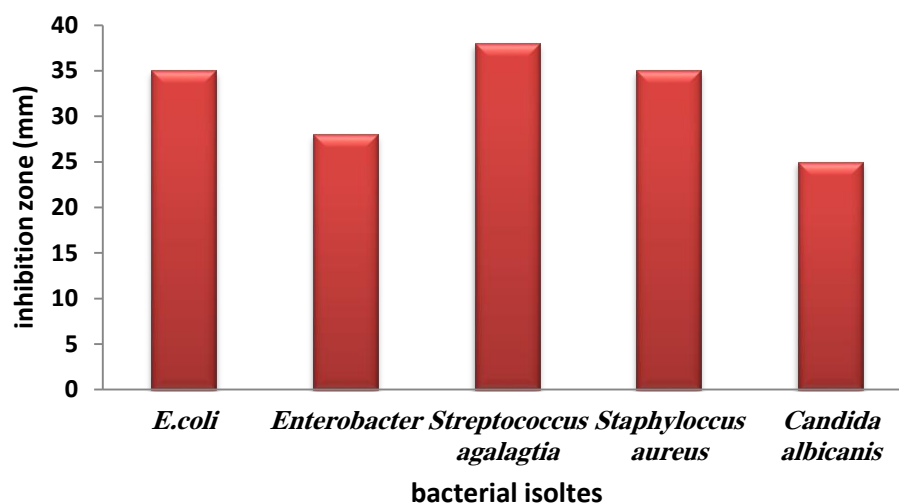
These results proved that aqueous plant extracts of *Quercus infectoria*, *Matricaria chamomilla* and chemical material Alum against bacterial and yeast vaginal infection, gave better effects rather than antibiotic ciprofloxacin.



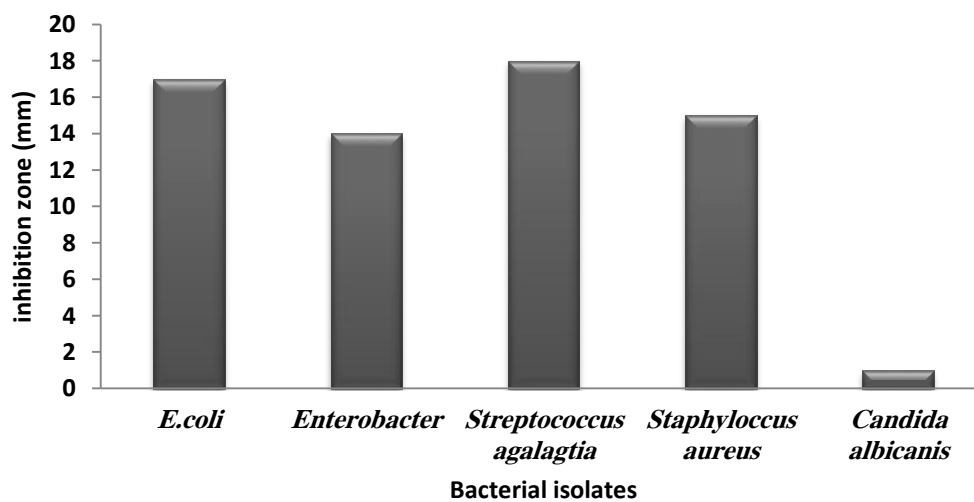
**Figure (1):** Effect of *Matricaria chamomilla* (Inhibition Zones (mm)) Against Different Bacterial Isolates from Women with Bacterial Vaginosis.



**Figure (2):** Effect of *Quercus infectoria* (Inhibition Zones (mm)) Against Different Bacterial Isolates from Women with Bacterial Vaginosis.



**Figure (3):** Effect of Alum (Inhibition Zones (mm)) Against Different Bacterial Isolates from Women with Bacterial Vaginosis.



**Figure (4):** Effect of Ciprofloxacin (Inhibition Zones (mm)) Against Different Bacterial Isolates from Women with Bacterial Vaginosis.

## Discussion

World have along history of application of traditional medicine and medicinal plants for treatment of bacterial and yeast infection. Our study revealed the probable activity of aqueous extracts of *Quercusinfectoria*, *Matricariachmomilla* and chemical material Alum salt as antibacterial agent. Alum salt showed high efficiency against tested bacteria (*strep. Agalactiae*, *staph.aureus*, *E.coli*, *Enterobacter spp.* and *Candida albicana*), which represented by inhibition zone range from (25-38mm). These agents have high antibacterial action against *Strep. Agalactiae*, which have high resistant to macrolides and lincosamides used as alternative drugs for individuals allergic to penicillin (18).

The initial results from this study could initiate to future effort to investigate how Alum salt inhibits growth of the bacteria and potential use of Alum salt. Prior studies have revealed that Alum is effective against a wide variety of microbial pathogens (19,20) including *Klebsiella pneumoniae*, *Escherichia coli* and *Staphylococcus aureus* (21,22). The mechanism of bactericidal effect of Alum is not well known (23). Some assumptions trait the antibacterial effect of Alum in reduction of acidity or toxic effects on bacterial cell wall.

Furthermore, histological studies confirm the safety of Alum salt for mammalian consumption (24). Also in this study these plant had a potential action against all bacterial agents in the vagina, these agents are

rich in a wide range of secondary active metabolites, such as flavonoids, terpenoids, alkaloids and tannins which have been reported *in vitro* to have antimicrobial activities, like chamomile (*matricaria chamomilla*) showed in this study high effect against tested bacteria and yeast. chamomile is excellent in treating any type of inflammation, whether internal or external (25). Chamomile extract, the antimicrobial effects are primarily the result of the active components  $\alpha$ -bisabolol and azulenes, which have an anti-inflammatory activity (26).

Moreover, other works were carried out and showed more than 120 chemical constituents, that have been identified in the chamomile flower as secondary active metabolites (27, 28) including 36 flavonoids and 28 terpenoids (29,30,31) and with additional 52 compounds having potential pharmacological activity (32).

While the aqueous of *Quercusinfectoria* had influential against this bacteria which used in this study (*strep. Agalactiae*, *staph.aureus*, *E.coli*, *Enterobacter spp.* and *Candida albicanis*) which may be retain to the active compound of the *Quercusinfectoria*. The research demonstrated the main active elements of the galls are gallic acid (2–4%), gallotannic acid (50–70%), starch, sugar and ellagic acid (33).

*Quercusinfectoria* used for different purposes like its usage as a constituent of toothpaste or toothpowder for the treatment of gum and oral cavity diseases; in the Indian

traditional medicine(34). The galls have been used to treat menorrhagia tonsillitis, gonorrhea, impetigo, dysentery diarrhea and internal hemorrhages (35).

Pharmacologically, the galls also had been informed to retain perfect activities such as wound healing, antiviral, antibacterial, anti-diabetic, antifungal, antiamoebic, anti-inflammatory and larvicidal(36,37), which proved by this study against bacteria and yeast.

Our study proof that all this plant extract and Alum salt extracts exhibited a more inhibitory activities on Gram positive bacteria. This result was agreed with many previous studies which had informed that the growth of Gram-positive bacteria was definitely inhibited by natural extracts of plant compared to Gram-negative bacteria (38). The reason for this variance may be attributed to the difference in bacterial cell wall structure and composition (39).

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## تأثير مستخلصات الجفت والبابونج والشب ضد البكتريا المعزولة من نساء تعاني التهاب المهبل

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ويعتبر مستخلصاتالنباتات مواد طبيعية وآمنة، يمكن الوصول إليها وغير مكلفة وقد زرعت لعلاج العدوى البكتيرية. أجريت هذه الدراسة لتحديد النشاط المثبط لجفت، البابونج والشب على التهاب المهبل البكتيري والعدوى الخمائر المهبليّة. درست الفعاليهالتثبيطيّه لهذه المستخلصات و الشب ضد المكورات العنقوديّة الذهبيّة، وستربتوكوكساكالاكشياي،انتيروبكترسبيشز، واي كولاي،وخميرة كانديدالبيكانا. تمت مقارنة التأثيرات المثبطة للمستخلصات مع السيبروفلوكساسين.

كان متوسط مناطق تثبيط التي تم الحصول عليها من هذه المستخلصات تتراوح بين (20-35 mm) وتوضح هذه الدراسة أن المستخلصات المائية لهذه المواد يمكن أن تستخدم كمصدر محتمل لعوامل المضادات الميكروبيه غير العادية والمستخدمة في التهاب المهبل البكتيري وعدوى الخميرة المهبليّة. أيضا، كانت الالتهابات البكتيرية هي أعلى استجابة للمستخلصات النباتية قياسا بعدوى الخميرة المهبليّة، خاصة بكتيريا ستربتوكوكساغالاكشياي.

معظم مستخلصات الجفت والبابونج بالاضافه الى المادة الكيميائيّة الشب تظهر نشاط مضاد للجراثيم عالية ضد أسباب مختلفة من المهبل، وبالتالي هذه المستخلصات الطبيعية يمكن أن توفر الحماية إلى حد ما ضد الأعداء الطبيعية