**Tikrit Journal of Pure Science**
*ISSN: 1813 – 1662 (Print) --- E-ISSN: 2415 – 1726 (Online)*
**Journal Homepage: http://tjps.tu.edu.iq/index.php/j**

# The effect of some plant extracts on the resistance *Staphylococcus spp*

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https://doi.org/10.25130/tjps.v26i3.135

**ARTICLE INFO.**
**Article history:**
**-Received: 1 / 3 / 2021**
**-Accepted: 1 / 6 / 2021**
**-Available online: / / 2021**
**Keywords:** *Staphylococci*, inhibiotion zone, crude extracts
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## ABSTRACT

*Staphylococci spp* ubiquitous, including a different species as normal flora. The most virulent and resistant to antibiotic are *Staphylococcus aureus* and *mutans*, species which colonizes epithelial surfaces and causes dangerous humans infections. The objectives of this study is studying and Using the agar agar weal diffusion process, researchers tested the The degree of susceptibility of bacteria from one type of plant extract to another varies for six different concentrations using several methods (50, 100, 200, 300, 400, 500 mg/ml) of each Aqueous and alcoholic plant extracted were used then evaluated. The alcoholic Ziziphus In this study, we see that the strongest activity of the extract against the tested bacterium Ziziphus. this analysis. Turmeric, alcoholic, and aqueous extracts, on the other hand, had comparable antimicrobial activity but at higher concentrations. However, against S. aureus and S. mutans, the aqueous extract of cuminum cyminum had no inhibitory action. The S. aureus isolates seemed to be resistant to the extracts of Ziziphus and Tumeric. The S. mutans isolate, on the other hand, was more susceptible to cuminum cyminum, but only at low concentrations.

## 1. Introduction

Antibiotic resistance raises health-care costs, lengthens hospital visits, and raises mortality rates. Antibiotics must be prescribed and used in a different manner. Vaccination, handwashing, safe sex, and proper food hygiene are all critical in the fight against infection. *Staphylococcus spp*[1]. is an opportunistic pathogen that causes a variety of purulent infections in people and animals.

It is one of the most common causes of hospital acquired disease [2,3].Under such conditions, *Staphylococcus spp* produces a variety of toxins that differentiate it in food circles, including Hemolysin Alpha, (which breaks down red blood cells in rabbits. Toxins that cause the dissolution of sheep's red blood cells), as well as toxins that cause the breakdown of white blood cells .In addition, enterotoxins produced by *Staphylococcus spp* are responsible for a significant number of food poisoning cases[4]. Adhesion factors and their ability to form biofilms are virulence factors that help bacteria flourish in the host's environment and are responsible for chronic or recurring infections. Medicinal plants are a category of plant that used in part or entirely for acquiring medicinal benefits. The use of medicinal plants has become extremely widespread in recent years, as they can help cure a variety of infectious diseases in both humans and animals [5]. They produce bacteria-killing products. Medicinal plants have been used by humans for diagnosis, cure, and treatment since the start of humanity. New antimicrobials with a variety of chemical compositions and useful mechanisms of action are urgently needed. According to Vrocquet, the rise in the prevalence of new and chronic infectious diseases is attributed to an increase in antibiotic resistance. The use of plants in plant extract preparations is largely determined by chemical analyses of these plants [6].Antimicrobial resistance emerges as a result as of drug-resistant pathogens developing novel resistance pathways. There aren't many new antimicrobials in clinical trials. Antibiotic-resistant bacteria, not humans or livestock, can cause infections in humans and animals. He says that accessing high-quality antimicrobials is still a big issue, and that scarcity of antibiotic stocks threaten countries at all stages of growth. The World Health Organisation has identified 32 antibiotics that are being used in clinical trials to treat pathogens.Since they serve as a shield to inhibit antibiotic entry, and possibly because they possess antibiotic enzymes such as beta-lactamases, the bacteria have a high

resistance factor to antibiotic care[7].*Staphylococcus spp* bacteria is transmitted by close interaction with individuals, exchanging personal objects, or handling infected equipment and tools. Pets can spread the infection. The bacteria are transmitted by the hands of health care staff, and injecting them into the bloodstream will result in a number of complications, including endocarditis and meningitis[8]. The aim of this study The effect of some plant extracts on the resistance *Staphylococcus spp.*

## 2-Materials and Methods

**Sample collection and identification**

Sample collection: The study included *Staphyloccoci spp.* 27 locally isolated from unrelated patients different clinical skin infections. All 27 locally isolated isolates cultured on a mannitol salt agar medium at 37 °C and were diagnosis using their morphological characteristics and biochemical tests [9], the process of determining, as well as special testing for each species' confirmation recognition technique. [8].

**Preparation of aqueous and alcoholic extract of plant**

The samples of plants used in the study Leaves, seeds, and roots of three medical plant including *Ziziphus*, *Tumeric*, and *cuminum cyminum* obtained from local plant herbal market in Samara city-Iraq. Aqueous and alcohol extracts of each plant part was prepared according to[10] :

50 grams of dry leaves is soaked overnight in 450ml ethanol (96%) and blended for 2 hours with a magnetic stirrer. They were then washed in tap water and dried for three days at 30-35 degrees Celsius. The dried plant material was crushed with an electric blender, collected in clean sacks, and placed in a dry location. After that, the extracts were purified onto gauze and filter paper. The solutions. The plant extract was held at 4 $^{o}$C in the dark before it was used. Aqueous extracts is produced using the same process as alcoholic extracts, but with pure water instead of alcohol. [10].

Phytochemical Screening Initial chemical disclosures were performed on *Ziziphus*, *Tumeric*, and *cuminum cyminum* extracts (aqueous and alcoholic) to identify secondary metabolic compounds as follows:- Alkaloids statements, Tests for Phytosterols, Tests for Carbohydrates, Tests for Glycosides, Tests for Flavonoids, Test for Tannins and phenols, Tests for amino acids and proteins[11].

**Evaluation of Anti-microbial Activity of Plant Extracts**

Muller Hinton Agar plates were prepared and 6 mm holes were then made using a sterile cork borer Petri dishes were cultured with one species of bacteria by then left for Allow for drying time of nearly 30 minutes. Within the well, sufficient quantities of various plant extract concentrations were applied and left before the fluid dispersed across the media. After that, the plates were held at 370°C for 24 hours. The inhibition areas were calculated after the incubation period was completed and the results were read. If there was noticeable development across the well, the findings were deemed unfavorable. [11].

**Statistical Analysis:**

The results obtained from the current experiments, statistical investigation using SAS software {version 17; USA} [12].

## 3. Results and Discussion

**Ziziphus, Tumeric, and Cuminum cyminum Crude Extract Bioassay**

Chemical detector findings with certain active compounds in extracts from three different types of medicinal plants[14]. It was discovered that Ziziphus and Tumeric both contain phenols.The presence of phenols[12], Alkaloids are a complex group of compounds that help plants protect themselves against herbivores and pathogenic fungi. Fruit and fruit elixir produce phenolics, which add to the bitterness and astringency. Resins, carbohydrates, flavones, terpenes, sterols, coumarines, fucoumarines, and triterbinoides are some of the compounds contained in plants. [13].

**Table 1: Chemical detection of bio-medically active substances for aqueous and alcoholic extracts of *Ziziphus, Tumeric, and Cuminum cyminum.***

| Plante Effective Matters | *Ziziphus* | *Tumeric* | *cuminum cyminum* |
|---|---|---|---|
| Glycosides | + | + | - |
| Alkaloides | + | + | + |
| Tannins | + | + | + |
| Saponins | + | + | + |
| Resins | + | + | + |
| Flavones | + | + | + |
| Terpenes& sterols | + | + | + |
| Phenols | + | + | + |
| Carbohydrates | - | - | + |
| Coumarines | + | + | + |
| Fu coumarines | + | + | + |
| Tri terbinoides | + | + | + |

(+): presence of Active compound (-): absence of active compound.

Phenolic compounds are present in a number of plant parts and are therefore an essential component of the human diet. Terpenes (also known as "terpenoids" or "isoprenoids") are the most diverse category of natural substances, with over 30,000 distinct types. Caffeine acid is found in abundance in many fresh fruits and vegetables, including plums, onions, and cucumbers[14,15].

**On Staphylococcus spp., the effects of Ziziphus, Tumeric, and Cuminum cyminum extract**

included results in figure (1) and figure (2) explain the effect of alcoholic and aqueous Ziziphus extract against *S. aureus* and *S. mutans*.

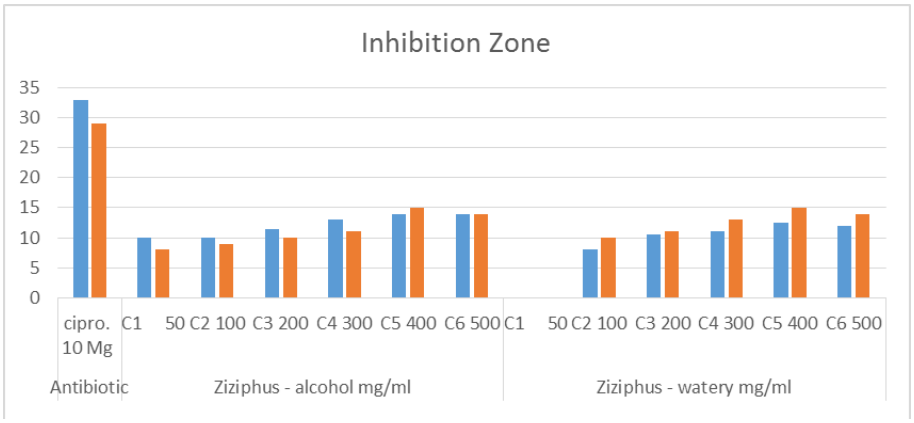


**Fig. 1: The inhibitory effect of *Ziziphus* aqueous and alcoholic extract on the growth of bacterial isolate *S. aureus and S. mutans*.**

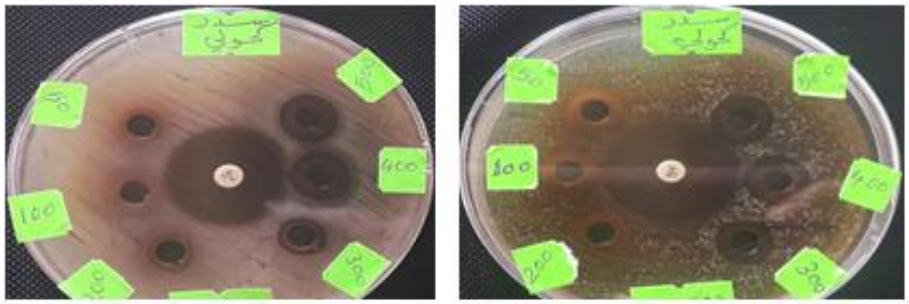

**Fig. 2: Using agar well diffusion process, the inhibitory action of *Ziziphus* alcoholic extract on the proliferation of *S. aureus and S. mutans* was tested.**

**Influence of *Turmeric* extract on *Staphylococcus spp***

more susceptible to the antibiotics than S. mutans. The evidence indicates that the extract is selective against the isolates in table 2, but there was no substantial difference between the extract and Ciprofloxacin. Fig (3) depicts this (4). The Turmeric aqueous extract was also found to be effective.

**Table 2: The growth of S. aureus and S. mutans bacteria was inhibited by Turmeric aqueous and alcoholic extracts.**

| Bacterial Isolates | 50 | 100 | concentrations 200 | 300 | 400 | 500 | "Ciprofolaxin" |
|---|---|---|---|---|---|---|---|
| ***Staphylococcus aureus*** | 10.5±0.57 A | 13.5±0.57 B | 15.5±0.76 C | 18±0 D | 22±0 D | 18±0 D | 22.5±0 D |
| ***Staphylococcus mutans*** | 15±0.57 A | 8±0.57 B | 12±1 C | 19.5±0 D | 22±0 D | 23.5±0 D | 21±0 D |

•The findings were described in the table, which is based on the average of the three replication of standard error**.**

•Chance {f-test (P0.05)}**.**

•There is a major variation (P0.05) between different letters within a column**.**

There is no noticeable variation in typeface inside a column (P>0.05)

• Determine the LSD values of 0.99, 1.40, 1.81, 1.89, 1.64, and 2.40. They're grouped in chronological order, beginning with isolation.

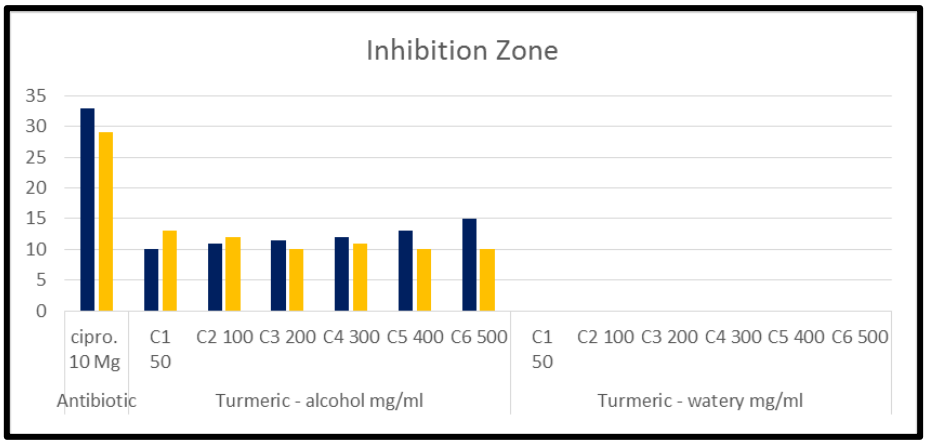


**Fig. 3: The inhibitory effect of *Turmeric* aqueous and alcoholic extract on the evolution of bacterial isolate *S. aureus* and *S. mutans*.**

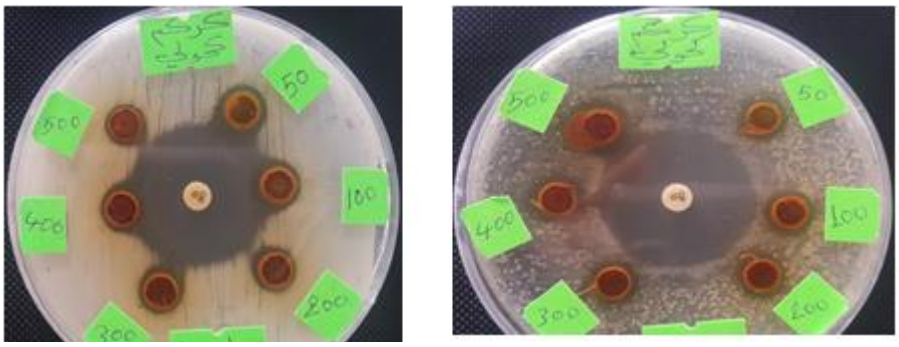

**Fig. 4: The inhibitory influence of *Turmeric* alcoholic extract on the evolution of bacterial isolate *S. aureus* and *S. mutans* using (Agar well diffusion method).**

**leverage of *cuminum cyminum* extract on *Staphylococcus spp***

Figures (5) and (6) shows that the extract and Ciprofolaxin have a substantial strong impact against the isolates at the same time.

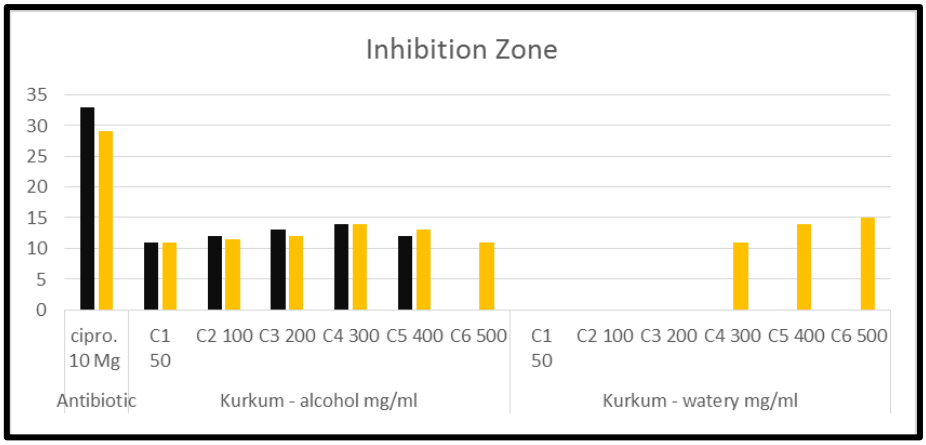


**Fig. 5: The development of S. aureus and S. mutans was inhibited by cuminum cyminum aqueous and alcoholic extracts.**

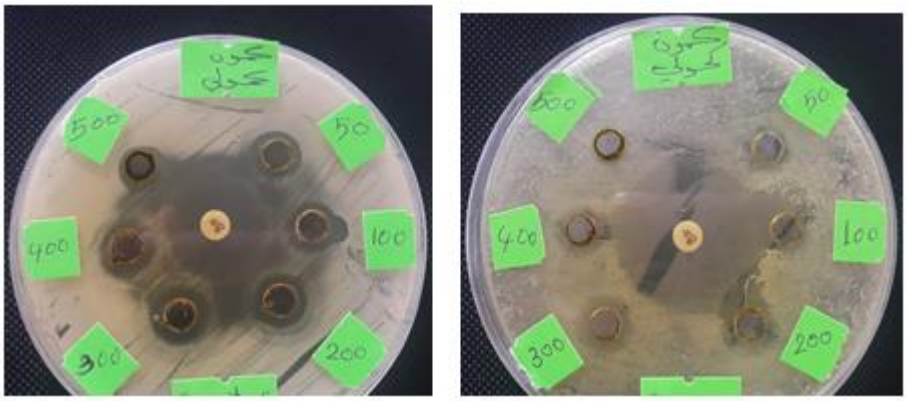


**Fig. 6: Explain inhibitory efficacy of *cuminum cyminum* alcoholic extract on the evolutions of bacterial isolate S. *aureus* and *S. mutans*.**

Founded results of this research support those of [16,17], who discovered that Ziziphus extracts have antibacterial action against both G-positive and G-negative bacteria. The phenolic community of plant extracts is primarily responsible for antibacterial action in Turmeric and c aluminum cyminum. Caffeic A [18]. Present in thyme, has antibacterial and antiviral properties. Anti-fungal and antibacterial functions Caffeics A., which can be present in thyme, is antifungal and antiviral [19,20]. The phenolic groups work on various locations on the bacterial cell wall, and it diffuses from the aqueous process into the cell membrane, expanding it [21]. The high rate of infections related to changes in medical practice with broad-spectrum antibiotics, *Staphylococcus aureus* and *mutans* a common pathogens caused Oral thrush, skin infection, and systemic disorder are among them[22].The *Staphylococcus aureus* and *mutans* consider most important types in the pathogenic events of being opportunistic, as they are present in the form of Norma flora at the site of their presence before the injury[23]. during the present study the application of therapeutic herbal medicines has gained significant results due to the no side effects and low toxicity of applied plant extracts which led to an increase in the number of herbal drug manufacturers, Herbal medicine has been used as a main treatment in the traditional medicine system since ancient times and to this day because of its biomedical benefits as well as its place in cultural beliefs in many parts of the world which made its contribution clear and significant towards preserving human health from the harmful effects of resistance *Staphylococcus aureus* and *mutans*[24].

## Conclusions

We concluded from the current results that theirs high activity regarding to aqueous and alcoholic extracts of the *Ziziphus, Turmeric and cuminum cyminum comparing with subjected antibiotic in the study* and the inhibitory activity against *Staphylococcus aureus* and *mutans*, in the current study increase with the increase of concentration used and in different manner.

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# تأثير بعض المستخلصات النباتية على أنواع المكورات المقاومة للمضادات الحياتية

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**الملخص**

بكتريا المكورات تسبب اصابات في اماكن مختلفه بما فيها الأنواع التي تستعمر الأسطح الظهارية وتسبب عدوى خطيرة للإنسان وأكثرها ضراوه هي المكورات العنقوديه والعقديه الطافره, أجريت هذه الدراسة لتقييم فعالية بعض المستخلصات النباتية المحضرة مائيا وكحوليا التي تشمل النبق (العناب) والكركم والكمون ضد بكتريا المكورات العنقودية والعقدية الطافرة المعزولة من حالات مرضية وباستخدام طريقة الأنتشار من خلال الحفر. حيث تم استخدام ستة تراكيز (50، 100، 200، 300، 400، 500 ملغم / مل) وتم قياس قطر منطقة التثبيط لكل تركيز تم استخدامه, لوحظ ان المستخلص المائي والكحولي لنبات العناب اكثر فعاليا ضد العزلات قيد الدراسه, الوقت نفسه نلاحظ لنبات الكمون نشاطًا تثبيطًيا عاليا ضد للبكتريا. وكذلك أن البكتريا مقاومه بدرجة عالية لمستخلصات الكركم والعناب. بينما كانت الحساسية ضد الكمون بتركيز منخفض من قبل عزلة العقدية الطافرة.بينما كان للكركم نفس النشاط المضاد للعزلات.