



Study of the Inhibitory Effect of *Ziziphus Spina-Christi* Leaf Extract on *Staphylococcus Arueus*

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Abstract

The purpose of this exploratory study is to determine the efficacy of secondary metabolic components in raw *Ziziphus spina-christi* leaf extracts and their impact on a particular the bacteria that infects females' external genital regions. Using the preliminary reagents, the active chemicals (glycosides, phenols, alkaloids, sugars, soaps, flavonoids, and titins) were identified in the extracts. The experiment was conducted three times to examine the crude extracts' efficacy against *Staphylococcus arueus*. The alcohol-containing *Ziziphus spina-christi* extract of leaves was the most effective of the extracts, and which varied in their inhibitory effects based on concentration, according to the data.

Keywords: *Ziziphus spina-christi*, *Staphylococcus Arueus*, leaf extract, antibacterial effect.

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Introduction

Christ's Thorn Jujube, or *Ziziphus spina-christi*, is a protected plant that thrives throughout tropical and subtropical areas, particularly the Middle East. With pharmaceutical operations throughout the Middle East, South Africa, and East Asia, its extracts are crucial for medication development. It has traditionally been used in complementary therapies to alleviate dandruff, discomfort, and fever. wounds, ulcers, asthma, paroxysmal disorders, and to cure eye disorders. *Z. spina-christi* has recently been shown to possess antibacterial, antifungal, antioxidant, and antihypertrophic properties. anti-allergic and hypoglycemic. Phytochemicals include flavonoids, alkaloids, and saponins (Asgarpanah and Haghighat, 2012) (Barrak, M. M., Al-Aidy, S. R., & Bonyadi, M. (2024)

It has a calming effect on the brain and nervous system and protects against mycotoxin. Gum, proteins, free sugar, dulse, alkaloids, flavonoids, and saponins These are the primary significant chemicals that define this plant. It makes a significant contribution to bettering human health (Ali and Hamed, 2006) in terms of treatment and prevention of diseases Additional pharmaceutical applications revealed antifungal, antibacterial, and antifungal activities. Anti-oxidant, anti-diabetic, anti-spasmodic, anti-lymphatic, and anti-inflammatory activities. Analgesic (J, 1996), and a more pronounced improved effect against organ damage caused by infection parasitic.

Staphylococcus aureus

The most harmful kind of common staphylococcal bacterium is *Staphylococcus aureus*. Skin infections are frequently caused by spherical, gram-positive bacteria, however they can also It can result in bone infections, cardiac valve infections, and pneumonia, all of which are frequently caused by bacteria. After smearing Gram, they appear on a light microscope as clusters that resemble grape bunches. The Greek word for "*staphylococcus*" means "cluster of grapes" (staphyle and kokkos berries). Spherical cells are seen



via scanning electron microscopy. Their surface is smooth. (Greenwood and O'Grady, 1972). Cells range in diameter from 0.5 to 1.0 μm (Foster, 1996). Cell electron microscopy Amorphous cytoplasm, thickened cell wall, and distinctive cytoplasmic membrane (Touhami *et al*, 2004). (AL-Azzawi *et al*, 2024).

They are commonly seen on the skin and throughout the upper respiratory tract. often favorable. It is a voluntary anaerobic material that may be cultivated without oxygen in order to decrease catalase and nitrate. *Staphylococcus aureus* can become a prevalent source of illness, though it typically functions as a symbiotic human microbe (Liu *et al.*, 2005). Skin conditions including abscesses, food labeling, and respiratory diseases like sinusitis. By generating virulence features such potent protein toxins and the production of an outermost cell protein that binds, pathogenic strains frequently encourage infection. Antibodies are rendered inactive. Methicillin-resistant *Staphylococcus aureus* (MRSA) and other antibiotic-resistant strains of *S. aureus* have emerged (Blair, 1958).

This bacterium is transmitted via contact with a person who is infected, the use of an item that is contaminated, or the inhalation of contaminated droplets dispersed by coughing or sneezing. Although skin infections are frequent, germs may enter the bloodstream and spread. It impacts organs that are far away. Blisters, abscess formation redness, and edema in the afflicted region are all possible outcomes of skin infections. (Masalha *et al.*, 2001)

Material and Methods

Plant Collection and Preparation

In the city of Thi Qar, *Ziziphus spina-christi* was gathered from the surrounding area. Samples were taken, and the plants were categorized in the Faculty of Science laboratories. After being separated from the other plant components, the leaves were cleaned, washed, and allowed to dry at room temperature in shade away from the sun while being constantly stirred to avoid rotting. An electric grinder was then used to grind the dry samples, and the ground material was stored in plastic containers with a tight-fitting cover until it was needed.

Preparing the Crude Extract of the Plant

Preparation of the aqueous extract of the leaves of the plant:

With a few minor adjustments, the procedure of Abu-Ghdeib and Shtayeh (1999) was used to prepare the aqueous extracts. 20 g of plant leaf powder and 150 ml of distilled water were added, and the mixture was stirred for an hour using a magnetic stirrer. After a 24-hour period, the extract was filtered using a vacuum system and filtered through filter paper with a 0.45 μm porosity to sterilize it. The extract was then concentrated using a rotating evaporator to create a concentrated extract, which was then stored in sterile bottles in a refrigerator until it was needed.

The process of making the alcoholic extract from *Ziziphus spina-christi*:

According to Augustine *et al.* (2012), alcoholic extracts were made by putting 20 grams of the powdered leaves of the plants under study in a Soxhlet thimble, using 250 milliliters of ethanol alcohol for eight hours, and then filtered the extracts through filter paper with a 0.45 μm porosity for sterilization. After being distilled in a rotary evaporator, the extracts were stored in sterile bottles in a refrigerator until they were needed.

Isolations

The bacteria samples used in this study were taken from a group of women who were for gynecological consultations at Shatra General Hospital and had illnesses in their external genital regions brought on by this particular strain of bacteria. Additionally, a number of biochemical tests, including the IMVC, Abi



20, oxidase, and catalase tests, were performed on it in the College of Science laboratories in order to diagnose microorganisms.



Figure 1. The Process of Preparing the Leaf Extract

Until they were needed, the pure bacterial samples were stored in preservation medium and preserved in the freezer. The experiment was then conducted three times, using the generated concentrations on the bacterial isolates to determine the inhibitory results.

Toxicological test

Following the toxicology test for the aqueous and alcohol-containing extracts of the relevant *Ziziphus spina-christi* leaves, the following outcomes were obtained based on the concentration series listed in the table below (Jens, 2007).



Figure 2. Toxicological Results of Aqueous and Alcoholic Extracts of *Ziziphus spina-christi* Leaves



Table 1. Toxicological Results of Aqueous and Alcoholic Extracts of *Ziziphus spina-christi* Leaves

Concentration	plant extract <i>Ziziphus spina-christi</i>	
	aqueous extract	alcohol extract
75%	-	+++
50%	-	++
25%	-	++
15%	-	+
10%	-	++
5%	-	+

Results

Efficacy of Different Concentrations of Plant Leaves against *Staphylococcus bacteria*

The results of the current study showed that the highest percentage of inhibition was for alcoholic leaf extract with a percentage of 16.0 ± 2.0 at 75% concentration, while the lowest level of effectiveness for leaf extract was 0.00 ± 0.0 at 5% concentration, and it was also observed that the effectiveness of the extracts increased with increasing concentration at a significant level P. value < 0.05

Table 2. The Effectiveness of Different Concentrations of *Ziziphus spina-christi* Leaves on the Activity of *Staphylococcus bacterium*

<i>Ziziphus s.</i>		Inhibition Zone mm ² Mean + SD <i>Staphylococcus</i>	
Concentration		C1	C2
75%	Cases No.= 3	10.6 ± 2.3^c	16.0 ± 2.0^c
50%		8.00 ± 1.0^d	14.3 ± 2.5^{bc}
25%		5.66 ± 0.5^c	11.3 ± 1.5^b
15%		4.00 ± 1.0^{bc}	11.3 ± 2.5^b
10%		2.00 ± 0.0^b	6.00 ± 1.0^a
5%		0.00 ± 0.0^a	4.00 ± 1.0^a
P. Value		< 0.01	< 0.01
LSD		2.01	3.32

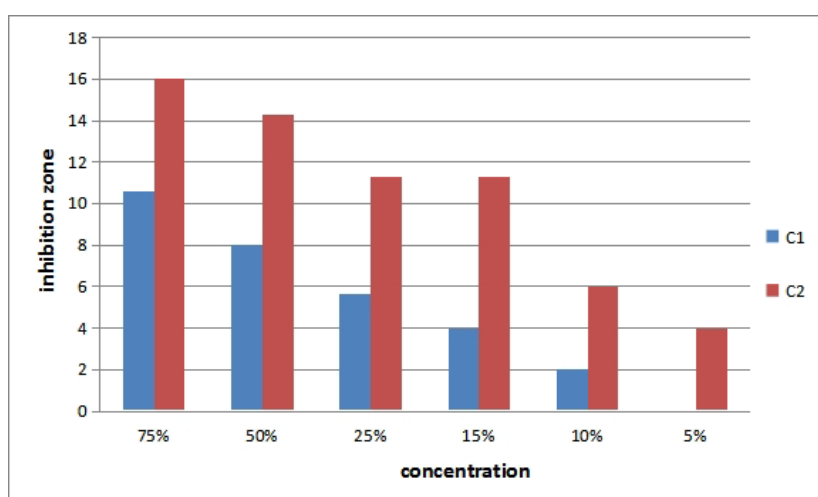


Figure 3. The Effectiveness of Different Concentrations of *Ziziphus spina-christi* Leaves on the Activity of *Staphylococcus bacterium*



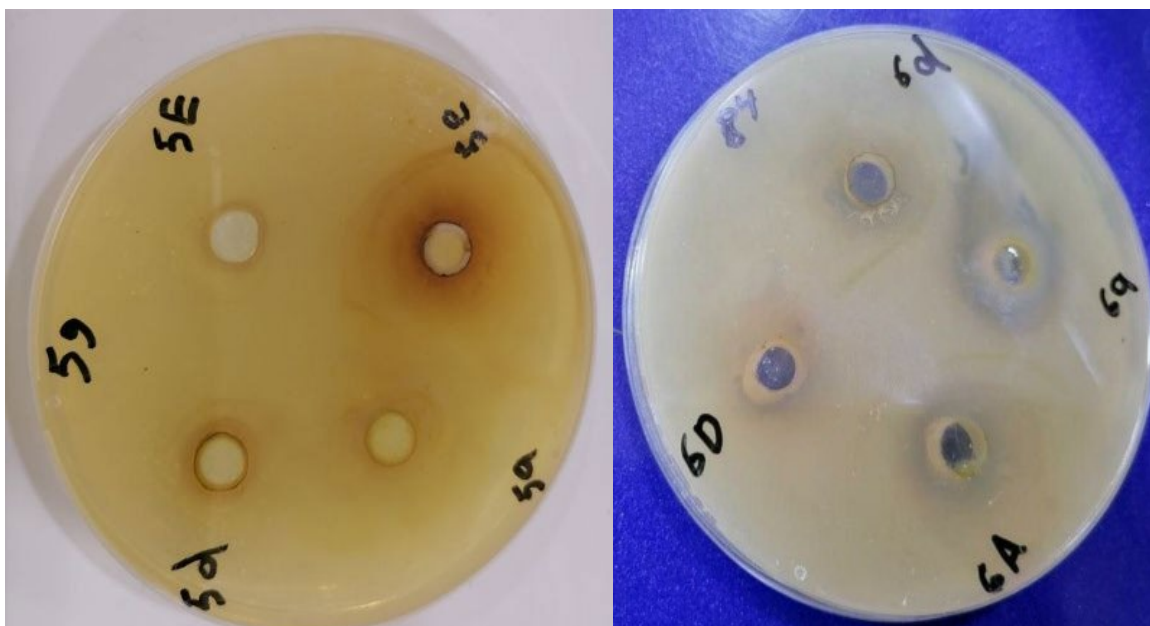


Figure 4. Reaction of the Bacterium *Staphylococcus aureus* to the Leaf Extract of *Ziziphus spina-christi*

Discussion

Man has used plants as a source to treat many diseases since time immemorial, and people on all continents have this ancient tradition. Despite the remarkable advances in synthetic organic chemistry in the 20th century, more than 25% of the medicines prescribed in industrialized countries are derived directly or indirectly of plants (Jameel *et al.*, 2016)

The selection of *Ziziphus spina-christi* was based on its availability as a medicinal plant, its many therapeutic and medical qualities, and the presence of several antibacterial components. Water and alcohol were the two solvent types used for extracting the inhibitory compounds in order to demonstrate how differently they affected the bacteria being studied.

Conclusion

When studying the use of aqueous Sidr leaf extracts as well as alcoholic Sidr leaf extracts, the results showed the presence of significant differences. The results of the experiments varied according to the type of extract, its concentration, and the level of high sensitivity of bacteria towards the extracts. The differences in the moral differences are due to the difference in the selected plant parts and the presence of effective chemical compounds in the plant extracts, and this is consistent with the Archer's study (Archer, 1998).

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