

# Effect of *Sonchus oleracea* Extract on Some Virulence Factor of *Klebsiella pneumonia* Which Isolated from Urinary Tract Infection in Ramadi Hospital

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## Abstract

**Background:** The plant contains vitamin C, thiamin, riboflavin, and some citrus and saponins. Medical benefits of wrapping Its medicinal benefits are attributed to the similarity between it and chicory Tonic and regulator of sugar level in The blood is a diuretic, a strong purgative, lowers the level of cholesterol in the blood and combats scurvy, as it is anthelmintic **Methodology:** Klebsiella bacteria were isolated from patients suffering from urinary tract infections in Ramadi General Hospital in selective media (Macconkey Agar), four concentrations of the aqueous and alcoholic extract were made 10%, 20%, 30 % and 40% to test the effectiveness of the extracts in inhibiting growth and virulence factors for bacteria. **Result:** the effect of the aqueous and alcoholic extracts of the *Sonchus oleracea* extract on the production of the biofilm of *Klebsiella* bacteria, where it was observed that there were significant differences in the concentrations of the aqueous and alcoholic extract in reducing the production of the biofilm of the bacteria, and the best concentration of the aqueous and alcoholic extract was 40%, where the biofilm concentration was 31 compared to the rest of the concentrations 3%, 20% and 10%, where its concentration reached .55, .64, and .74, respectively, and compared to the control, where its concentration was .98%. It was not noted that there were significant differences between the concentrations of plant extracts and aqueous and alcoholic extract in Reducing biofilm yield. **conclusion** the results explain that this plant has many It is one of the effective compounds such as vitamin C, thiamin, riboflavin, and some citrus and saponins. That destroy the cell wall and thus reduce the production of the biofilm and that these compounds increase by increasing the concentration of plant extracts, and this explains the effect of the high concentration in reducing the production of the biofilm.

**Keywords:** of *Sonchus oleracea* extract, virulence factor of *klebsiella pneumonia*

## Introduction

Scientific name: *Sonchus oleracea* It is a plant species that follows the genus *Sonchus* of the Asteraceae family.<sup>(1,2,3)</sup> This genus includes many species, most of which are annual and some are perennial, many of which are native to Arab countries.<sup>(4,5,6)</sup> It is a periwinkle grass that has a hollow stem that reaches a length of between (30\_100) cm, preferably wrapping the sun.<sup>(7,8,9)</sup> It can tolerate all soil conditions.<sup>(10,11)</sup> Its hermaphroditic flowers are pollinated by insects (bees and flies) and spread by seeds spread by wind and water.<sup>(12,13)</sup> It is considered an invasive wrap of plants in many parts of the world The site Plants for the Future (pfaf) stated that

the edible parts are the leaves, stalk and root Wrapping leaves are eaten as vegetables, a cooked salad like spinach, used in Chinese cuisine (boiling), and the leaves can be added to salads or soups.<sup>(15,16)</sup> Active substances The plant contains vitamin C, thiamin, riboflavin, and some citrus and saponins.<sup>(17)</sup> Medical benefits of wrapping Its medicinal benefits are attributed to the similarity between it and chicory Tonic and regulator of sugar level in The blood is a diuretic, a strong purgative, lowers the level of cholesterol in the blood and combats scurvy, as it is anthelmintic (boiled plant root).<sup>(2)</sup> It is a disinfectant for the urinary tract and kills germs and microbes and purifies toxins. And anti-inflammatory and inhibitor of gallstones.<sup>(18)</sup>

## Materials and methods

### Isolation and diagnosis of bacteria

Klebsiella bacteria were isolated from patients suffering from urinary tract infections in Ramadi General Hospital in selective media (Maconkey Agar) and it was diagnosed using biochemical methods and the use of VITEC 2 device to obtain a diagnosis of 99%

### Plant extract

The plant was extracted to obtain aqueous and alcoholic extract. The method of work included cutting the plant, drying it and weighing 25 grams of it and dissolving in 5 volumes of distilled water and ethyl alcohol at a temperature of 70 °C for an hour after that, four concentrations of the aqueous and alcoholic extract were made 10%, 20%, 30 % And 40% to test the effectiveness of the extracts in inhibiting growth and virulence factors for bacteria<sup>(2)</sup>

### Haemolysin production

The ability of bacteria to produce hemolysin was investigated by transferring the bacterial suspension K p on the blood agar medium to which (5%) of human blood type AB was added) afterwards, a mechanism (3%) of agar-agar was added before sterilization with the autoclave for the purpose of obtaining The purpose of that is to impede the anthropogenic movement that characterizes these bacteria, and then they were placed in the incubator for a period of (24 hours) at a temperature of (37 ° C). Then the hemolysis regions were observed<sup>(7)</sup>

### B\_Lactamase production Rapid Iodometric \_ Lactamase

It was used to investigate the ability of *K.Pneumonia* to produce-lactamase enzyme, and the test was done according to the following sequential steps

1- The bacterial cultures to be tested were prepared at a lifetime (24 hours)

2- A pure and young colony of K.p bacteria was transferred by the conveyor Loop after sterilization on a flame and placed in sterile test tubes containing (100 µl) of Penicillin G solution, after which these sterile tubes were incubated for 30 minutes) degree Heat (37 ° C) was added (50 µl) of starch solution to the tubes and mixed well.

- 3.A 20-microliter of iodine solution Penicillin G solution was added to each test tube and it was observed that the aforementioned solution turned into a dark blue color as a result of the interaction of Starch with iodine, after which the contents of these tubes were mixed well for one minute.

4- The positive result is inferred when a change in color occurs very quickly from blue to white in a very short period of time up to one minute after adding the reagent (iodine)<sup>(8)</sup>

## Result and Discussion

Table 1 shows the effect of the aqueous and alcoholic extracts of the *Sonchus oleracea* extract on the production of the biofilm of *Klebsiella bacteria*, where it was observed that there were significant differences in the concentrations of the aqueous and alcoholic extract in reducing the production of the biofilm of the bacteria, and the best concentration of the aqueous and alcoholic extract was 40%, where the biofilm concentration was 31 compared to the rest of the concentrations 3% , 20% and 10%, where its concentration reached .55, .64, and .74, respectively, and compared to the control, where its concentration was .98%. It was not noted that there were significant differences between the concentrations of plant extracts and it was not also noted that there were significant differences between the aqueous and alcoholic extract in Reducing biofilm yield

**Table (1) Effect of *Sonchus oleracea* extract on biofilm production for *klebsiella pneumonia* bacteria**

Descriptive Statistics				
Dependent Variable: biofilm production				
plant extract	concentration of plant extract	Mean	Std. Deviation	N
Aqueous extract	10%	.7640	.00548	5
	20%	.6460	.01517	5
	30%	.5540	.00548	5
	40%	.3160	.00894	5
	control	.9820	.01304	5
	Total	.6524	.22565	25
Alcoholic extract	10%	.7240	.04159	5
	20%	.5800	.14036	5
	30%	.5080	.09960	5
	40%	.3160	.00894	5
	control	.9820	.01304	5
	Total	.6220	.23878	25
Total	10%	.7440	.03502	10
	20%	.6130	.10034	10
	30%	.5310	.07078	10
	40%	.3160	.00843	10
	control	.9820	.01229	10
	Total	.6372	.23044	50

Table 2, analysis table of variance, shows that there are significant differences between the concentrations of aqueous and alcoholic extract compared to the control and that a concentration of 40% is the best concentration in reducing the production of the biofilm compared to the rest of the concentrations, and there were no significant differences between the concentrations and the type of

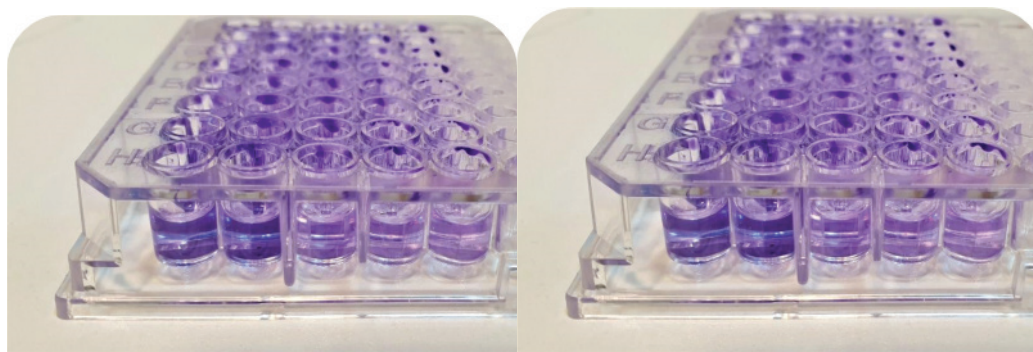
extracts, the results explain that this plant has many It is one of the effective compounds such as vitamin C, thiamin, riboflavin, and some citrus and saponins. That destroy the cell wall and thus reduce the production of the biofilm and that these compounds increase by increasing the concentration of plant extracts, and this explains the effect of the high concentration in reducing

the production of the biofilm

**Table (2) ANOVA table of effect of *Sonchus oleracea* extract on biofilm production for *klebsiella pneumonia* bacteria**

Tests of Between-Subjects Effects					
Dependent Variable: biofilm production					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.473a	9	.275	85.510	.000
Intercept	20.301	1	20.301	6316.488	.000
extract	.012	1	.012	3.594	.065
concentration	2.453	4	.613	190.827	.000
extract * concentration	.009	4	.002	.671	.616
Error	.129	40	.003		
Total	22.903	50			
Corrected Total	2.602	49			

a. R Squared = .951 (Adjusted R Squared = .939)



**Figure 1 effect of *Sonchus oleracea* extract on biofilm production for *klebsiella pneumonia* bacteria**

Table 3 shows the effect of the aqueous and alcoholic extracts of the *Sonchus oleracea* extract on beta lactamase activity of *Klebsiella bacteria*, where it was observed that there were significant differences in the concentrations of the aqueous and alcoholic extract in reducing the beta lactamase activity of the bacteria, and the best concentration of the aqueous and

alcoholic extract was 40%, where the beta lactamase activity concentration was 31 compared to the rest of the concentrations 3% , 20% and 10%, where its concentration reached .55, .64, and .74, respectively, and compared to the control, where its concentration was .98%. It was not noted that there were significant differences between the concentrations of plant extracts

and it was not also noted that there were significant differences between the aqueous and alcoholic extract in Reducing beta lactamase activity.

**Table (3) Effect of Sonchus oleracea extract on beta lactamase activity for klebsiella pneumonia bacteria**

Descriptive Statistics				
Dependent Variable: beta lactamase enzymes				
plant extract	concentration of plant extract	Mean	Std. Deviation	N
Aqueous extract	10%	.7540	.02302	5
	20%	.6280	.01483	5
	30%	.4860	.10015	5
	40%	.3160	.00894	5
	control	.9140	.11327	5
	Total	.6196	.22069	25
Alcoholic extract	10%	.7000	.16492	5
	20%	.5200	.17378	5
	30%	.4420	.15738	5
	40%	.3160	.00894	5
	control	.8180	.24181	5
	Total	.5592	.23883	25
Total	10%	.7270	.11461	10
	20%	.5740	.12946	10
	30%	.4640	.12651	10
	40%	.3160	.00843	10
	control	.8660	.18506	10
	Total	.5894	.22962	50

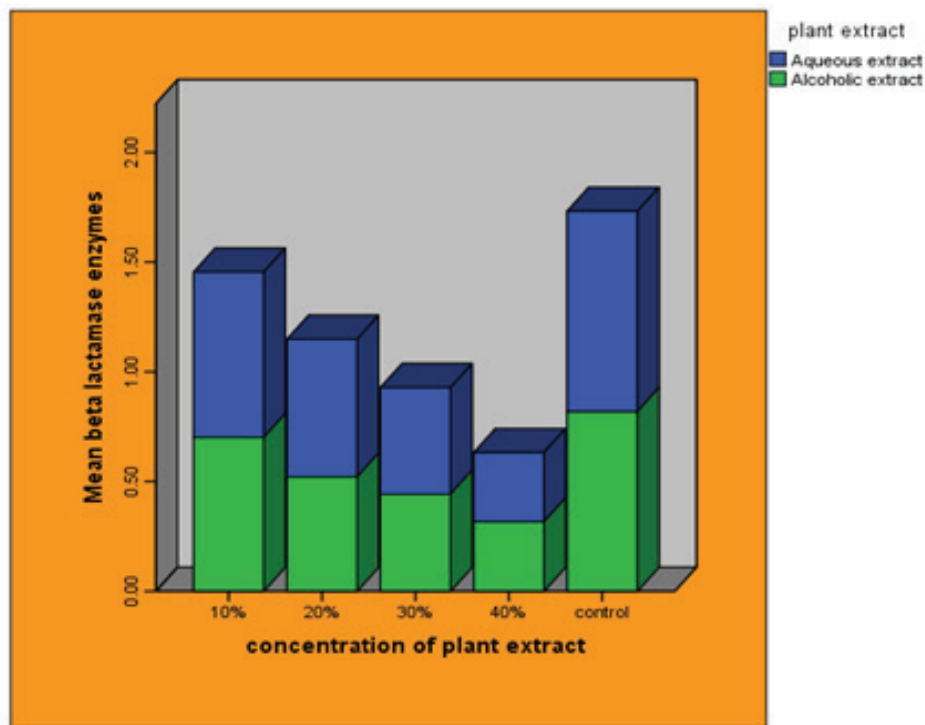
Table 4, analysis table of variance, shows that there are significant differences between the concentrations of aqueous and alcoholic extract compared to the control and that a concentration of 40% is the best concentration in reducing beta lactamase activity compared to the rest of the concentrations, and there were no significant differences between the concentrations and the type of extracts, the results explain that this plant has many It

is one of the effective compounds such as vitamin C, thiamin, riboflavin, and some citrus and saponins.that destroy the cell wall and thus reduce the production of beta lactamase activity and that these compounds increase by increasing the concentration of plant extracts, and this explains the effect of the high concentration in reducing the beta lactamase activity

**Table (4) ANOVA table of Effect of *Sonchus oleracea* extract on beta lactamase activity for *klebsiella pneumonia* bacteria**

Tests of Between-Subjects Effects					
Dependent Variable: beta lactamase enzymes					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.926 <sup>a</sup>	9	.214	13.015	.000
Intercept	17.370	1	17.370	1056.482	.000
extract	.046	1	.046	2.774	.104
concentration	1.862	4	.465	28.306	.000
extract * concentration	.019	4	.005	.285	.886
Error	.658	40	.016		
Total	19.953	50			
Corrected Total	2.583	49			

a. R Squared = .745 (Adjusted R Squared = .688)



**Figure 2 Effect of *Sonchus oleracea* extract on beta lactamase activity for *klebsiella pneumonia* bacteria**

## Conclusion

The plant extract contains many active compounds that have contributed to inhibiting the growth in bacteria. The active compounds also destroyed the bacterial wall and altered the function of the plasma membrane, which led to the inhibition of many metabolic processes, including the formation of beta-lactam enzymes and the formation of the biofilm.

**Conflict of Interest:** None

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**Ethical Clearance:** Not required

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