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## Study the sensitivity of gram positive bacteria to antibiotic and hot watery extract of red cabbage

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**Abstract**---Aim This study was conducted to study the sensitivity of some positive bacteria *Staphalococcus aureus*, *Streptococcus pyogenes*, *Listeria monocytogenes*, *Bacillus subtilis* to some antibiotics PenicillinG(10mg), Clarithromycin(15mg), Cefixime(5mg),, Tetracycline (30mg), Amoxillin Clavulanicacid (30mg) ,) Doxycycline (30mg), Trimethoprin (5mg), Erythromycin (15mg), Enrofloxacin(5mg), Ampicillin(10mg), the sensitivity results showed that the zone of inhibition was from (10-30)mm in each antibiotic, *Staphalococcus aureus* *Streptococcus pyogenes* and *Bacillus subtilis* sensitivite to 70% and resistant to30% of antibiotic, *Listeria monocytogenes* sensitivite to30% and resistant to70% of antibiotic in this study the antibacterial effect of hot watery extract of Red cabbage(20mg)on these bacteria the result of inhibition zone of extract was from(10-25)mm this indicate that Red cabbage extract play an important antibacterial effect like the antibiotic used in this study.

**Keywords**---bacteria, sensitivity, antibiotic, plant, red cabbage extract.

### Introduction

several plant contain functional groups in their structure, their antimicrobial activity is attributed to multiple mechanisms<sup>1</sup>.Red cabbage *Brassica oleracea var. capitata rubra* has a remarkable popularity due to the fact that it is rich with vitamins (K, E, C, and A), antioxidants, phytochemicals, and minerals (potassium, magnesium, calcium, iron, and manganese), along with its low contents of cholesterol and saturated fatty acids. Furthermore, B vitamins, such as thiamine (B-1), riboflavin (B-2) and folate (B-2) were reported to be produced in red cabbage. In addition to these minerals and vitamins, cabbage contains some proteins Additionally, the protective actions associated with the cruciferous

vegetables were attributed to the existence of antioxidant phytochemicals, particularly  $\beta$ -carotene, ascorbic acids, anthocyanine, polyphenols, flavonoids, gluosinolate, and  $\alpha$ -tocopherol<sup>2,3</sup>

Natural products isolated from higher plants have been providing clinically active drugs which made the scientists to identify the potent and effective antimicrobial agents of plant origin to replace the antibiotics. modern drugs are derived from natural sources using either natural substances or synthesized versions<sup>4</sup>. Red cabbage (*Brassica oleracea* L. var. *capitata* f. *rubra*) Plants belong to the family *Brassicaceae* and include several of the most commonly consumed vegetables all over the world. Among them 'turnip' *Brassica rapa* L. It is known in the Unani and Arab traditional medicine for its use in liver diseases chronic gastritis, constipation, cholecystitis, cholecystolithiasis and in chronic gastritis<sup>5,6</sup> red cabbage extract proving its anticancer anti-inflammatory anti-diabetic effects only two studies for its antibacterial effects<sup>7,8</sup> These plants have a positive effect on the activity of antioxidant enzymes such as glutathione peroxidase, superoxide dismutase, catalase, and ascorbate peroxidase. The phytochemical profile and antioxidant potential of *Brassica* plants make them the preferable candidates for nutritional and pharmaceutical applications<sup>9</sup>. The main objective of our study is to investigate the antibacterial activity of Red cabbage against some gram positive bacteria and sensitivity to antibiotic

## Methods

### Plants extract preparation

Red cabbage (*Brassica oleracea* var. *capitata rubra*) was collected from local markets of Baghdad. The vegetable was washed thoroughly under running tap water to remove dirt and then shade dried at room temperature for a week. They were ground into fine particles after drying and kept in closed container. (50) gm ground powder of Red cabbage soaked in 250 ml of hot distilled water, The mixture is uniformed by electric blender for 30 minutes in 24hr at room temperature then separated in centrifuge for 3000 cycle in 15 min then the solution filter by Whatman No.1 then the solution dried in Rotary vacuum evaporator in temp 40c then dried in incubator for 3-4 days then filtered in millipore filter 0.2, Disc diffusion method was used for antibacterial activity. A stock solution of extract was prepared by dissolving 0.1 g of extract with 100 mL to produce a final concentration of 100 mg/mL. The stock solution was then diluted to concentrations of 20mg, dilution was impregnated into sterile, blank discs 6 mm in diameter. 5  $\mu$ L of extract was spotted alternately on both sides of the discs and allowed to dry before the next 5  $\mu$ L was spotted to ensure precise impregnation. ethanol-loaded and Distilled water discs and were used as negative controls for aqueous extracts, respectively. Antibacterial activity was evaluated by measuring the diameter of the inhibition zone (IZ) around the discs. Antibacterial activity was expressed as the mean zone of inhibition diameters (mm) produced by the leaf extract<sup>10</sup>

### Antibiotics susceptibility test

To study the susceptibility of the bacteria against antibiotics PenicillinG(10mg), Clarithromycin(15mg), Cefixime(5mg), Tetracycline (30mg), Amoxillin Clavulanicacid (30mg), Doxycycline(30mg), Trimethoprin(5mg), Erythromycin(15mg), Enrofloxacin(5mg), Ampicillin(10mg), Subactam(10mg) the trial was accomplished using a disc diffusion method on Mueller hinton Agar, measurement of diameter of the inhibition zone <sup>11</sup>

### Microbial strains

pure cultures of bacteria namely *Staphalococcus aureus*, *Streptococcus pyogenes*, *Listeria monocytogenes*, *Bacillus subtilis* were obtained from zoonosis unit, College of Veterinary Medicine, University of Baghdad , Overnight cultures of the above mentioned strains were used for this study

### Results

the sensitivity results showed that the zone of inhibition was from (10-30)mm in each antibiotic, *Staphalococcus aureus* *Streptococcus pyogenes* and *Bacillus subtilis* sensitivite to 70% and resistant to30% of antibiotic, while *Listeria monocytogenes* sensitivite to30% and resistant to70% of antibiotic , result in this study that Red cabbage extract act as antibacterial like the antibiotic used by inhibition zone (15-20mm)and the antibiotic from (10-30mm)Tapple 1.

Table 1: Results of inhibition zone of bacteria by antibiotic and hot watery extract of Red cabbage

Antibiotic	<i>Staphalococcus aureus</i>	<i>Streptococcus pyogenes</i>	<i>Listeria monocytogenes</i>	<i>Bacillus subtilis</i>
Red cabbage	15mm	20mm	20mm	20mm
PenicillinG	30mm S	25mm R	10mm R	15mm R
Clarithromycin	25mm S	20mm S	10mm R	20mm
Cefixime	10mm R	25mm S	10mm R	15mm R
Tetracycline	25mm S	25mm S	20mm R	30mm S
Amoxillin Clavulanicacid	30mm S	10mm S	10mm S	25mm S
Doxycycline	30mm S	30mm S	10mm R	30mm S
Trimethoprin	15mm R	25mm S	15mm S	15mm R
Erythromycin	20mm R	20mm R	10mm R	15mm S
Enrofloxacin	25mm S	10mm R	25mm S	20mm S
Ampicillin	15mm S	30mm S	10mm R	15mm S

S= Sensitive,R=Resistant

### Discussion

Many studies attempted to investigate the effect of crude plants extracts on different bacteria to support the antibacterial activity, Red cabbage is a rich source of phenolic compounds, mainly anthocyanins which are the most

abundant class<sup>12</sup>. Antimicrobial activity studies of <sup>13</sup> zones of inhibition were observed of the red cabbage extract on Gram positive bacteria (7-17 mm in diameter). where as other study found that red cabbage juice has mild activity against *Staphylococcus epidermidis*<sup>14</sup> while other study found that the red cabbage fractions seem to be active against *B. subtilis*<sup>15</sup> and in study of other research find the antibacterial activity of red cabbage on *Staphylococcus aureus*<sup>16</sup>, in study reported that Red cabbage is potent antimicrobial action on *Staphylococcus aureus*<sup>17</sup> the antibacterial effect of was found to be effective in inhibiting the growth of *Listeria monocytogenes*<sup>18</sup>. Many study on The sensitivity of bacteria to antibiotic pattern of *S. aureus* to the Gentamicin, Amoxicillin/clavulanate, Streptomycin, Cloxacillin, Erythromycin, Chloramphenicol, Cotrimoxazole, Tetracycline, Penicillin, Ciprofloxacin, Ofloxacin, Levofloxacin, Ceftriaxone, Amoxicillin and vancomycin were 92.4%, 63.0%, 44.2%, 35.8%, 52.4%, 61.9%, 15.5%, 31.2%, 7.1%, 78.9%, 76.6%, 100%, 71.4%, 30.7% and 100% respectively<sup>19</sup>. In author study 6% of *L. monocytogenes* strains isolated showed multiresistance to ampicillin, erythromycin, tetracycline, dicloxacillin, and trimethoprim-sulfamethoxazole<sup>20</sup>. The *S. pyogenes* were sensitive penicillin, amoxicillin, and cephalosporins 100% of the isolates were resistant to tetracycline<sup>21</sup> *Bacillus subtilis* were sensitive to tetracycline (8.0 mg/liter), vancomycin (4.0 mg/liter), and gentamicin (4.0 mg/liter) but resistant to streptomycin. Sensitivity to clindamycin, chloramphenicol, and kanamycin was species specific.<sup>22</sup>

## Conclusion

This study concluded that Red cabbage extract play an important antibacterial effect like the antibiotic used in this study.

## Author Contribution

The author had the major contribution in practical part implantation, paper writing, editing and reviewing

## Declaration of competing interest

the author declare no conflicts of interest.

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