

Antibacterial Activity of Allium Sativum L. Aqueous Extract Against Some Pathogenic Bacteria Isolated from Patients Infected with Corona Virus

Hussein J. Hussein^{1*}, Sabreen A. Kamal¹, Nebras Mohammed Sahi¹, Safa Hasan Radhi²

¹ Department of Biology; College of Science for women; University of Babylon-Iraq

² Department of Biology; College of Science; Al-Qasim Green University-Iraq

E-mail: huss2010feb@yahoo.com

Abstract

A study was conducted in Hillah city, Babil province in Iraq, for the purpose of knowing the extent of the effects of the constituents of Allium sativum fresh bulb, by utilizing aqueous extract against some bacterial species isolated from infected patients with Corona Virus represented by Escherichia coli, Staphylococcus aureus, Enterobacter Cloacae, Serratia marcescens, and Klebsiella pneumoniae, and, the ability of antibacterial was completed by utilizing the method of agar well diffusion by preparing four concentrations (400, 300, 200&100mg/ml). Sterile distal water was utilized as a negative control. Constituents separated by aqueous extract at (400mg/ml) exhibited significant supremacy at (Probability ≤ 0.05) over the negative control after applied to Escherichia coli, Staphylococcus aureus, Enterobacter Cloacae, Serratia marcescens at ($P \leq 0.05$) in compared with the negative control. Whereas Klebsiella pneumoniae fully resistance to all concentration Lastly, Constituents in the fresh bulbs of Allium sativum respected a good source for controlling some bacterial species isolated from infected patients with Corona Virus.

Keywords: Allium sativum, Antibacterial activity, Corona Virus.

1. Introduction

Garlic has been used as a food and medicinal plant through the years. Antimicrobial, antiviral, and immunostimulatory effects are attributed to garlic, so it is widely recommended to treat diseases like asthma, bronchitis, influenza, and some others [1]. Garlic (Allium sativum) belong to the genus Allium, a monocotyledonous genus of flowering plants informally referred to as the onion genus found in the family Alliaceae. The generic name Allium is the Latin word for garlic. Several members of the genus, especially the various edible onions, garlics, cloves and leeks play a vital role in cooking worldwide, as various parts of the plants; either raw or cooked produce large varieties of flavours and textures [2]. The use of herbal drug is increasing. One of these plants used most intensively and widespread is garlic. Historically, garlic has been used for centuries worldwide by various societies to combat infectious disease. Garlic can be provided in the form of capsules and powders, as dietary supplements, and thus differ from conventional foods or food ingredients. Louis Pasteur was the first to describe the antibacterial effect of onion and garlic juices. Allium vegetables, particularly garlic (Allium sativum L.) exhibit a broad i) antibacterial activity against Gram-negative and Gram-positive bacteria, including multidrug-resistant enterotoxigenic strains of Escherichia coli; ii) antifungal activity, particularly against Candida albicans; iii) antiparasitic

activity, including some major human intestinal protozoan parasites such as Entamoeba histolytica and Giardia lamblia; and iv) antiviral activity [3]. World Health Organization (W.H.O), reported that, Medical plants, which are as enough to be able to meet community needs and provide primary health care under the aggravation of the problem of antibiotic resistance, because of their own effective substances that capable of making difference and hope for the future [4]. Secondary metabolites produced by medicinal plants have ability to act as bacteriostatic and bactericidal against "multidrug resistance" microorganisms and regarded a good precursor for synthesis new antibiotics and drugs for controlling infectious diseases, However, this study was aimed to examine the ability of antibacterial of constituents of Allium sativum L. fresh bulbs by using aqueous extract against some bacterial species isolated from infected patients with Corona Virus.

2. Materials&Methods

Materials of Plant: Allium sativum L. fresh bulbs had been purchased from the local markets, identified based on the taxonomic features, fresh bulbs of this plant were cleaned, dried, and kept according to [5].

Plant Material extraction: Extraction was completed by a method according [6]. The stock solution of 400mg/ml prepared in distal water. The size (0.22 μ m) of Millipore filter was used for sterilization all extracts used in this study and then, stored in refrigerator at (-20C°), for a short period, then it applied for the microorganisms [7].

Antibacterial Activity: Agar well diffusion method was utilized to test the ability of antibacterial of Allium sativum fresh bulbs against some bacterial species isolated from infected patients with Corona Virus [8]. Cork porer with size 6mm in diameter used to make wells in agars. Control negative was made by adding sterile

distal water in wells.

Pathogenic Bacteria Isolates: Isolates of some bacterial species isolated from infected patients with Corona Virus obtained from Microbiology laboratories in different hospitals within the boundaries of the municipality of Hillah-Iraq (Table:-1).

Table:-1: Pathogenic Isolates and sources of isolates

NO	Isolates	Source
1	Escherichia coli	Patients infected with Corona Virus
2	Staphylococcus aureus	
3	Enterobacter Cloacae	
4	Serratia marcescens	
5	Klebsiella pneumonieae	

3. Results

The antibacterial ability of phytochemical complexes separated from (Allium sativum L.), fresh bulb by using aqueous extract counter to some bacterial species isolated from infected patients with Corona Virus existing in a (table-2). Action of the plant achievement by agar well diffusion method (Figure:-1,2,3, and 4). The outcomes displayed that, the aqueous extract (Allium sativum L.) fresh bulbs exhibited significant decline in ($P \leq 0.05$) in the growing of some bacterial species isolated from infected patients with Corona Virus in compared with the negative control. Antibacterial ability was utilized at (400, 300, 200, and 100mg/ml), and formerly, compared with sterile distal water as the control negative treatment. Inhibitory area rise

significantly at ($P \leq 0.05$) by means of increasing concentration at (400mg/ml). The outcomes of the current study uncover that, water extract Allium sativum extract was significantly superior to the control negative when applied to E. coli pathogenic bacteria with inhibition diameter (23 ± 1.0) compared with (0 ± 0.0) in a negative control, the results also revealed that, the constituents extracted by water extract in (400mg/ml), exhibited the decline influences in other pathogens under study like Staphylococcus aureus, Enterobacter Cloacae, Serratia marcescens. There were no the significant changes at ($P \leq 0.05$), in aqueous extract of Allium sativum at concentration (100mg/ml) in all isolates under study. On the other hand, K. pneumonieae showed complete resistance to all concentrations used in this study (Table:-2).

Table:-2: An antibacterial efficacy of aqueous extract for Allium sativum L fresh bulb against some bacterial species isolated from infected patients with Corona Virus. LSD= 1.6

Bacteria	Aqueous extract of garlic			
	Concentration mg /ml			
	Inhibition zone / mm			
Concentration	400mg/ml	300mg/ml	200mg/ml	100mg/ml
Escherichia coli	23 ± 1	17 ± 1	13 ± 1	0 ± 0
Staphylococcus aureus	20 ± 1	15 ± 1	13 ± 1	0 ± 0
Enterobacter Cloacae	21 ± 1	13 ± 1	0 ± 0	0 ± 0
Serratia marcescens	14 ± 1	13 ± 1	0 ± 0	0 ± 0
Klebsiella pneumonieae	0 ± 0	0 ± 0	0 ± 0	0 ± 0

The existing investigation similarly, exposed that, there are growing declines in the isolates of some bacterial species isolated from infected patients with Corona Virus

with the increasing of concentrations of constituents obtained by utilizing water extract compared to the control negative treatment represented by sterile distal water.



Figure:-1. Antibacterial activity of aqueous extract of (Allium sativum L) at (400, 300, 200, and 100, mg/ml) counter to E. coli



Figure:-2. Antibacterial activity of aqueous extract of (Allium sativum L) at (400, 300, 200, and 100, mg/ml) counter to E. Cloacae



Figure:-3. Antibacterial activity of aqueous extract of (Allium sativum L) at (400, 300, 200, and 100, mg/ml) counter to S. marcescens

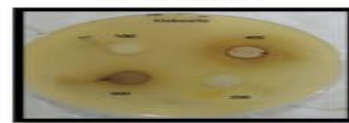


Figure:-4. Antibacterial activity of aqueous extract of (Allium sativum L) at (400, 300, 200, and 100, mg/ml) counter to K. pneumonieae

4. Disscution

Development of resistance pathogenic bacteria to

drugs in human, animals, and crops as well as unwanted side effects of these drugs, and there are also, many sick conditions that are difficult to treat

using chemical drugs for fear of deteriorating the patient's health condition. In contrast, the medicinal plant is also, characterized by being an integrated pharmacy and contains more than one effective substance that works synergistically with each other in treating the disease. All these factors combined has generated vast attention toward exploration for new safe drugs of plant derivation Especially, in light of the high global poverty rates due to wars, suffocating economic crises, and high prices for chemical treatments. There is no doubt that the effective compounds extracted from medicinal plants remain one of the important, if not the most important, sources in the fight against diseases, especially in light of the aggravation of the problem of microorganism's resistance to antibiotics, Medicinal plants are also less harmful in terms of side effects compared to chemical drugs. Constituents separated from different active parts of numerous medicinal plants such as (*Lactuca serriola* leaves; *Lepidium sativum* leaves; *Myrtus Communis* leaves; *Cassia senna* leaves; *Ricinus communis* leaves; *Cassia didymobotrya* leaves; *Melia azedarach* leaves; *Dianthus caryophyllus* flowers bud; and *Salvia hispanica* seeds), possess ability of antibacterials for controlling several pathogenic microorganisms isolated from different clinical samples [9, 10, 11, 12, 13, 14, 15, 16, 17]. [18] Reported that, constituents separated from the unicellular primitive plant like *Chlorella vulgaris* possess ability of antibacterial counter to pathogenic bacteria. [19] Used phytochemical compounds separated from *Hibiscus sabdarifa* for controlling *E. coli* and *Proteus sp.* [20] Used constituents extracted from of *Ficus carica L.* for controlling *E. coli* and *Pseudomonas aeruginosa*. [21] Used phytochemical compounds extracted from *Boswellia carteri* and *Curcuma longa* for controlling *Fusarium sp.* isolated from seeds of corn. [22] Used terpenoids compounds extracted from *Carthamus tinctorius L.* against *Aspergillus* species isolated from stored medicinal plant seeds. Secondary metabolites represented by Alkaloids and Flavonoids compounds separated from *M. Communis* leaves respected a worthy source for controlling pathogenic microorganisms segregated from hemodialysis fluid specimens [23]. [24] Used *Callistemon viminalis* leaves extracts for controlling isolates of Urinary Tract Infections. Alkaloids and Terpenoids extracted from the roots of *Saussurea costus* have powerful antifungal activity against *Candida* species [25], and also Secondary metabolite compounds extracted from the *D. caryophyllus L.* flower buds such as terpenoid and flavonoid have powerful antifungal activity against *Candida* species [26]. The principal phytochemicals that exhibit antibacterial activity are oil-soluble organosulfur compounds that include allicin, ajoenes, and allyl sulfides. The organosulfur compounds of garlic exhibit a range of antibacterial properties such as bactericidal, antibiofilm, antitoxin, and anti-quorum sensing activity against a wide range of bacteria including multi-drug resistant (MDR) strains [27]. The extracts of *Allium* species

have antibacterial activities against both Gram positive and Gram negative bacteria [28]. The current study has proven that the Constituents found in the *Allium sativum* plant are very effective against microorganisms isolated from the infected patients with Corona Virus, and therefore, can be recommend the possibility of using them against other pathogenic isolates as well as using them against fungi and insects and detection of these Constituents by using Gas chromatography and Mass spectrometry.

5. Conclusion

Constituents extracted from fresh bulbs of *A. sativum* by utilizing aqueous extract regarded the respectable sources for controlling of some bacterial species isolated from infected patients with Corona Virus.

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