European Journal of Botany, Plant Sciences and Phytology

Vol.3, No.3, pp.15-19, September 2016

Published by European Centre for Research Training and Development UK (www.eajournals.org)

Influence of the crude Phenolic, Alkaloid and Terpenoid compounds extracts of *Cardaria draba* (*Lepidium draba* L.) on Human Pathogenic Bacteria

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ABSTRACT: *Objective: To reveal the effect of the crude phenolic, alkaloid and terpenoid compounds extracts of Cardaria draba (Lepidium draba L.) on some Human Pathogenic Bacteria. Methods: Antibacterial activities of the crude Phenolic, Alkaloid and Terpenoid of medicinal plant were determined by in vitro by agar well diffusion-method against some human pathogenic bacteria. Results: obtained results showed that active compounds of Cardaria draba (Lepidium draba L.) had wide spectrum antibacterial activity against gram-positive and gram-negative bacteria.Conclusion: This study demonstrates that we can conclude that the effect of active compounds in same plant has different effect on different pathogenic organisms in different concentration.*

KEYWORDS: Antibacterial Activity; *Cardaria draba* (*Lepidium draba* L.); Pathogenic Bacteria

INTRODUCTION

Nature has been a source of medicinal agents for centuries. The importance of herbs in the management of human ailments cannot be overemphasized. It is clear that the plant kingdom harbors an inexhaustible source of active ingredients valuable in the management of many intractable diseases [1]. Antibiotic resistance has become a global concern [2].There has been an increasing incidence of multiple resistances in human pathogenic microorganisms in recent years, largely due to indiscriminate use of commercial antimicrobial drugs commonly employed in the treatment of infectious diseases. This has forced scientists to search for new antimicrobial substances from various sources like the medicinal plants. Search for new antibacterial agents should be continued by screening many plant families. Existing reports have revealed the potential of several herbs as sources of drugs [3]. The screening of plant extracts and plant products for antimicrobial activity has shown that higher plants represent a potential source of novel antibiotic prototypes [4]. Numerous studies have identified compounds within herbal plants, which are effective antibiotics [5]. Traditional healing systems around the world that utilise herbal remedies are an important source for the discovery of new antibiotics [6].

ISSN 2055-8139(Print), ISSN 2055-8147(Online)

Cardaria draba (Brassicaceae; syn. *Lepidium draba* (L) Link), commonly known as whitetop or hoary cress, is a perennial herb that reproduces by seed and by horizontal creeping roots ,*C. draba* is native to western Asia, including Iran, and eastern Europe and is an invasive species in North America, introduced by contaminated seeds in the early 1900s [7]. Infusion of *C. draba* leaves and seeds have purgative and expectorant effects [8].
This study aimed to assess the *in vitro* the possible effects of antibacterial activity of active compounds of *Cardaria draba* (*Lepidium draba* L.) upon Human Pathogenic Bacteria.

MATERIALS AND METHODS

Collection of Plant Material: The aerial parts of *Cardaria draba* (Brassicaceae; syn. *Lepidium draba* (L) Link) were collected from the botanical garden of Babylon university, Hilla, Iraq in July, 2012. The plant was identified by the taxonomist, Professor Dr. Abdull-Alkareem AL-Bermani, at the College of science for women, Babylon University. The leaves were washed thoroughly 2-3 times with running water and once with sterile distilled water, leaf material was then air-dried on sterile blotter under shade.

Solvent Extraction: Twenty five grams of shade-dried powder was filled in the thimble and extracted successively with methanol solvent in Soxhlet extractor for 24h. The solvent extracts were concentrated under reduced pressure and preserved at 5°C in airtight bottle until further use. One gram of each concentrated solvent extracts were dissolved in 9 ml of distilled water and used for antibacterial assays.

Phenolic Extraction: Crude Phenolic compounds were extracted according to [9].

Alkaloid Extraction: Crude Alkaloid compounds were extracted according to [10].

Terpenoid Extraction: Crude Terpenoid compounds were extracted according to [11].

Preparation of Inoculum: The gram positive and gram negative bacteria were pre-cultured in nutrient broth overnight at 37°C,

Anti-bacterial Activity: The organism to be tested was inoculated into sterile nutrient agar. After incubation period of 24 h at 37°C, a loop of inoculum was transferred into 5 ml of nutrient broth and incubated for 2 hr at 37°C which served as fresh suspension inoculum. Five wells (5 mm diameter) were made in sterile nutrient agar plate by using Cork borer (one in the center and four wells at the corner) and inoculum containing 106 CFU/ml of test bacteria were spread on solid plates with the help of sterile swab moistened with the bacterial suspension. Then 50 µl of extract of all the leaves were placed in the wells made in inoculated plates. The treatment also includes 50 µl of sterilized distilled water as control. All the plates were incubated for 24 hr at 37°C and zone of inhibition if any around the well were measured in millimeter (mm). For each treatment three replicates were maintained.

ISSN 2055-8139(Print), ISSN 2055-8147(Online)

RESULTS

The antibacterial activity of Terpenoid, Alkaloid and Phenolic compounds extracts of selected plants against human pathogenic bacteria both Gram-positive and Gram-negative bacteria are presented in Table (1).

Table 1: Antibacterial Activity of the crude phenolic, alkaloid and terpenoid *Cardaria draba* (Brassicaceae; syn. *Lepidium draba* (L) Link) against some human pathogenic bacteria

Pathogenic bacteria	Phenolic compounds		Alkaloid compounds		Terpenoid compounds	
	Concentrations					
	50 mg/ml	100 mg/ml	50 mg/ml	100 mg/ml	50 mg/ml	100 mg/ml
	Inhibition zone/ mm/ diameter					
Staphylococcus aureus	R	R	13	16	12	18
Staphylococcus epidermedis	R	R	R	15	R	R
Staphylococcus saprophyticus	R	R	R	15	R	10
Klebsilla	R	R	R	R	R	R
Serratia	15	20	12	15	10	12
Proteus	R	R	R	R	10	12
Escherichia coli	R	R	R	R	R	R
Pseudomonas	R	R	R	R	10	R
Provedenatia	R	R	R	R	R	R

- R= Resistant

Activity was analyzed at (50 & 100) mg/ ml. the results revealed that both *Staphylococcus aureus* and *Staphylococcus saprophyticus* Gram-positive were susceptible for Alkaloid and Terpenoid compounds, while *Staphylococcus epidermidis* was susceptible for Alkaloid compounds only. The results also revealed that all Gram-negative bacteria were resistant to active compounds except *Serratia* was susceptible for Phenolic, Alkaloid and Terpenoid compounds, while *Proteus* and *Pseudomonas* were susceptible for Terpenoid compounds only.

DISCUSSION

Medicinal plants are considered new resources for producing agents that could act as alternatives to antibiotics in the treatment of antibiotic-resistant bacteria [12]. On the basis of the result obtained in this present investigation, we conclude that the effect of active compounds in same plant have different effect on different pathogenic organisms in different concentration. This implied that the gram-positive bacteria were more susceptible to the active compounds extract than the gram-negative bacteria. Possibly because of the presence

ISSN 2055-8139(Print), ISSN 2055-8147(Online)

of outer membrane that serves as an effective barrier in gram-negative species [13]. In addition, the results showed that gram-positive bacteria the most susceptible bacteria, an observation that may be attributed to the presence of single membrane of the organism which makes it more accessible to permeation by active principles of the extract of active compounds [14]. The Results of this study demonstrated that active compounds in *Cardaria draba* (Brassicaceae; syn. *Lepidium draba* (L) Link) exhibited antimicrobial activity against the Gram negative bacteria In addition, to gram positive bacteria, this may be attributed to the presence of active compounds effect on cell wall, proteins and DNA synthesis. The obtained results may provide a support to use of the plant in traditional medicine. Based on this, further chemical and pharmacological investigations to isolate and identify minor chemical constituents in *Cardaria draba* (Brassicaceae; syn. *Lepidium draba* (L) Link) and to screen other potential bioactivities may be recommended.

REFERENCES

1. Shariff, Z.U. (2001). Modern herbal therapy for common ailments. *Nature Pharamcy Ser*, Vol. 1, pp. 9-84.
2. Afolayan, A.J. (2003). Extracts from the shoots of *Arctotis artotoides* inhibit the growth of bacteria and fungi. *Pharm Biol*, Vol 41, pp.22-25.
3. Iwu, M.M & Wootton, J.C, (Ed(s).). (2002) *Threapeutic Agents from Ehtnomedicine*, Elsevier Science, Amsterdam.
4. Westh, H.; Zinn, CS. & Rosdahl, VT. (2004). an international multicenter study of antimicrobial consumption and resistance in *Staphylococcus aureus* isolates from 15 hospitals in 14 countries. *Microb Drug Resist*, Vol.10, pp. 169-76.
5. Basile, A.; Sorbo, S.; Giordano, S.; Ricciardi, L.; Ferrara, S. & Montesano D, *et al*. (2000). Antibacterial and allelopathic activity of extract from *Castanea sativa* leaves. *Fitoterapia, Vol.71*, pp.110-116.
6. Okpekon, T.; Yolou, S.; Gleye, C., Roblot, F., Loiseau, P. & Bories, C. (2004). Antiparasitic activities of medicinal plants used in Ivory Coast. *J Ethnopharmacol*, Vol 90, pp. 91-97.
7. Agriculture Research Service (1970). *Cardaria draba* (L.) Deav. Selected Weeds of the United States. Agriculture Research Service United States, Department of Agriculture, Washington, DC, 200pp.
8. A. Ghahreman. Basic botany (2009). Tehran: Tehran University Press, 504pp.
9. Ribereau-Gayon, P.R. (1972). Plant phenolic –Oliver and Boyd. Edinburph.
10. Harborne, J. B. (1973). Phytochemical methods. Halsted Press. John Wiedly of sons, New York. 278pp.
11. Harborne, J. B. (1984). Phytochemical methods. Chapman and Hall. New York 2nd Ed. 288pp.
12. Al-Mariri, A. and Safi, M. (2014). In Vitro Antibacterial Activity of Several Plant Extracts and Oils against Some Gram-Negative Bacteria. (39): 1, pp36-43.
13. Adesokan, A.A.; M.A. Akanji and M.T. Yakubu, (2007). Antibacterial potentials of aqueous extract of Enantia chlorantha stem bark African J. Biotechnol., 6(22): 2502-2505.

ISSN 2055-8139(Print), ISSN 2055-8147(Online)

14. Girish, H. V. & Satish, S. (2008). Antibacterial Activity of Important Medicinal Plants on Human Pathogenic Bacteria-a Comparative Analysis. World Applied Sciences Journal 5 (3): 267-271.

ISSN 2055-8139(Print), ISSN 2055-8147(Online)