Available online on www.ijpqa.com
International Journal of Pharmaceutical Quality Assurance 2018; 9(1); 11-14
doi: 10.25258/ijpqa.v9i01.11353

ISSN 0975 9506

Research Article

Bioactivities, Characterization, and Therapeutic Uses of *Dracaena cinnabari*

Israa Adnan Ibraheam [1], Haider Mashkoor Hussein [2], Imad Hadi Hameed[*]

[1]*Department of Biology, College of Science for women, University of Babylon, Iraq*
[2]*College of Science, University of Al-Qadisiyah, Iraq*
[3]*College of Nursing, University of Babylon, Iraq*

Received: 8th Oct, 17; Revised: 4th Dec, 18; Accepted:10th Jan, 18; Available Online:25th March, 2018

ABSTRACT

Young specimen of *Dracaena cinnabari* in the Koko Crater Botanical Garden, Honolulu, Hawaii, United States The dragon blood tree has a unique and strange appearance, with an "upturned, densely packed crown having the shape of an uprightly held umbrella". This evergreen species is named after its dark red resin, which is known as "dragon's blood". Its leaves are found only at the end of its youngest branches; its leaves are all shed every 3 or 4 years before new leaves simultaneously mature. Branching tends to occur when the growth of the terminal bud is stopped, due to either flowering or traumatic events (e.g. herbivory). The trees can be harvested for their crimson red resin, called dragon's blood, which was highly prized in the ancient world and is still used today. Dragon's blood is used as a stimulant and abortifacient. The root yields a gum-resin, used in gargle water as a stimulant, astringent and in toothpaste. The root is used in rheumatism, the leaves are a carminative. The local inhabitants of the city in the Socotra Island use the dragon's blood resin as a cure-all. They use it in general wound healing, as a coagulant, cure for diarrhea, for dysentery diseases, for lowering fevers. It is also taken for ulcers in the mouth, throat, intestines and stomach.

Keyword: *Dracaena cinnabari*, Review, GC-MS, Bioactivities, Characterization, Therapeutic, Applications.

INTRODUCTION

Unlike most monocot plants, Dracaena displays secondary growth, D. cinnabari even has growth zones resembling tree rings found in dicot tree species[1-3]. Along with other arborescent Dracaena species it has a distinctive growth habit called "dracoid habitus". Its fruits are small fleshy berries containing between 1 and 3 seeds. As they develop they turn from green to black, and then become orange when ripe[4-10]. The berries are eaten by birds (e.g. Onychognatus species) and thereby dispersed. The seeds are 4–5 mm in diameter and weigh on average 68 mg. The berries exude a deep red resin, known as dragon's blood. Like other monocotyledons, such as palms, the dragon's blood tree grows from the tip of the stem, with the long, stiff leaves borne in dense rosettes at the end. It branches at maturity to produce an umbrella-shaped crown, with leaves that measure up to 60 cm long and 3 cm wide[11-16]. The trunk and the branches of the dragon blood are thick and stout and display dichotomous branching, where each of the branches repeatedly divides in two sections. Around the Mediterranean basin it is used as a dye and as a medicine, Socotrans use it ornamentally as well as dying wool, gluing pottery, a breath freshener and lipstick. Because of the belief that it is the blood of the dragon it is also used in ritual magic and alchemy. The resin of *D. cinnabari* is thought to have been the original source of dragon's blood until during the mediaeval and renaissance periods when other plants were used instead[17].

Bioactivities and therapeutic uses

Antimicrobial and antiviral activity

The aqueous ethanol extract, some fractions of the methanol extract, catechin and acetyl aleuritolic acid of Sangre de Drago obtained from Croton urucurana are reported to show inhibition of *Staphylococcus aureus* and *Salmonella typhimurium*[20-22]. Study reported in vitro antifungal activity of Sangre de Drago from Croton urucurana, which could be due to the presence of catechins like gallocatechin and epigallocatechin. Antiviral properties of Croton's sap have also been evaluated.

Antitumor and cytotoxic activity

A number of compounds isolated from Sangre de Drago (Croton) are found to show cytotoxicity. Taspine from Croton lechleri sap has shown potent activity againstKBandV-79 cells, while flavan-3-ols and proanthocyanidins, which are the major components of the sap, are not cytotoxic[23].

Antihemorrhagic activity

Total inhibition of hemorrhage was observed, probably owing to the chelation of zinc required for the catalytic activity of venom's hemorrhagic metalloproteinases[24-30]. Aqueous extracts of Croton urucurana antagonized the hemorrhagic activity of the venom of Bothrops jararaca and proanthocyanidins were involved in this activity.

**Author for Correspondence: imad_dna@yahoo.com*

Table 1: Major phytochemical compounds identified in *Dracaena cinnabari*.

Part of plant	System	Effects	Preparation	Ref.
Root		stimulant, astringent and in toothpaste	root yields gum	9
	treatment	rheumatism	extract	10
		diarrhoea in travellers	extract	10
		Antimicrobial antiviral activity	extract	11
		Antitumor	extract	12
		Antihemorrhagic	extracts	5 6
	Bioactivities and therapeutic	Antiulcer	powder	28
		antidiarrhoeal	extracts	26
		Analgesic	extracts	27
		Antioxidative Anti-inflammatory Mutagenic Antimutagenic Wound healing activity	extracts	4
	immune response	Immunomodulator	extracts	28
Resin		wound healing	Ethanol extract	12
		coagulant	Extract	12
	tretment	diarrhea lowering fevers Hemostatic and antithrombotic	Powder /infusion	12
		Analgesic activity		
		dysentery diseases	Extract	12
		carminative	Methanol extracts	12
Trees		dying wool, gluing pottery, a breath freshener and lipstick ritual magic and alchemy	Extract	
Leaves		carminative		10

Immunomodulatory activity

The human immune response is a highly complex system involving both innate and adaptive mechanisms. A biological or pharmacological effect of compounds on humoral or cellular aspects of the immune response is referred as immunomodulating activity[31-35].

Antiulcer and antidiarrhoeal activity

The extracts from Croton species have been shown to impair the capsaicin-stimulated ion transport across guinea pig ileum when added to the serosal bath in Ussing chambers and thus may prove to be a cost-effective treatment for gastrointestinal ulcers.

Antioxidative activity

Researcher suggested that Sangre de Drago (Croton lechleri) is highly effective in scavenging peroxyl and hydroxyl radicals at high concentrations. However, prooxidant activity was observed at lower concentrations[36-40].

Anti-inflammatory activity

In a study on edema in rats, reported, for the first time, anti-inflammatory activity of alkaloid taspine isolated from Croton latex. The latex from Croton lechleri has strong anti-inflammatory activity when administered.

Mutagenic and antimutagenic activity

The mutagenic and antimutagenic activity of Croton lechieri sap was examined through the Ames/Salmonella test and no mutagenicity of 2-aminoanthracene was found in the Salmonella typhimurium strains T98 and T100[41-44].

ACKNOWLEDGEMENT

I thank Dr. Ali Al-Marzoki, College of Science for Women, for valuable suggestions and encouragement.

REFERENCES

1. Adolt R, Pavlis J. Age structure and growth of Dracaena cinnabari populations on Socotra. Trees - Structure and Function. 2004; 18: 43–53.
2. Edwards H, De Oliveira L, Prendergast H. Raman spectroscopic analysis of dragon's blood resins? basis for distinguishing between Dracaena (Convallariaceae), Daemonorops (Palmae) and Croton (Euphorbiaceae). The Analyst. 2004; 129 (2): 134–8.
3. Edwards H, de Oliveira F, Quye A. Raman spectroscopy of colored resins used in antiquity: Dragon’s blood and related substances. Spectrochimia Acta Part A: Molecular and Biomolecular Spectroscopy. 2001; 57:2831–2842.
4. Tsai WJ, Hsieh HT, Chen CC, Chen CF, Kuo YC, Chen CF. Characterization of the antiplatelet effects of (2S)-5- methoxy-6-methylflavan-7-ol from

Draconis Resina. European Journal of Pharmacology. 1998; 346: 103–110.
5. Kadhim MJ, Sosa AA, Hameed IH. Evaluation of anti-bacterial activity and bioactive chemical analysis of *Ocimum basilicum* using Fourier transform infrared (FT-IR) and gas chromatography-mass spectrometry (GC-MS) techniques. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(6): 127-146.
6. Mohammed GJ, Kadhim MJ, Hussein HM. Characterization of bioactive chemical compounds from *Aspergillus terreus* and evaluation of antibacterial and antifungal activity. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(6): 889-905.
7. Hameed IH, Altameme HJ, Idan SA. *Artemisia annua*: Biochemical products analysis of methanolic aerial parts extract and anti-microbial capacity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2016; 7(2): 1843- 1868
8. Hussein AO, Mohammed GJ, Hadi MY, Hameed IH. Phytochemical screening of methanolic dried galls extract of *Quercus infectoria* using gas chromatography-mass spectrometry (GC-MS) and Fourier transform-infrared (FT-IR). Journal of Pharmacognosy and Phytotherapy. 2016; 8(3): 49-59.
9. Sosa AA, Bagi SH, Hameed IH. Analysis of bioactive chemical compounds of *Euphorbia lathyrus* using gas chromatography-mass spectrometry and fourier-transform infrared spectroscopy. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(5): 109-126.
10. Altameme HJ, Hadi MY, Hameed IH. Phytochemical analysis of *Urtica dioica* leaves by fourier-transform infrared spectroscopy and gas chromatography-mass spectrometry. Journal of Pharmacognosy and Phytotherapy. 2015; 7(10): 238-252.
11. Mohammed GJ, Omran AM, Hussein HM. Antibacterial and Phytochemical Analysis of *Piper nigrum* using Gas Chromatography-Mass Spectrum and Fourier-Transform Infrared Spectroscopy. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(6): 977-996.
12. Hamza LF, Kamal SA, Hameed IH. Determination of metabolites products by *Penicillium expansum* and evaluating antimicobial activity. Journal of Pharmacognosy and Phytotherapy. 2015; 7(9): 194-220.
13. Jasim H, Hussein AO, Hameed IH, Kareem MA. Characterization of alkaloid constitution and evaluation of antimicrobial activity of *Solanum nigrum* using gas chromatography mass spectrometry (GC-MS). Journal of Pharmacognosy and Phytotherapy. 2015; 7(4): 56-72.
14. Hadi MY, Mohammed GJ, Hameed IH. Analysis of bioactive chemical compounds of *Nigella sativa* using gas chromatography-mass spectrometry. Journal of Pharmacognosy and Phytotherapy. 2016; 8(2): 8-24.
15. Hameed IH, Ibraheam IA, Kadhim HJ. Gas chromatography mass spectrum and fourier-transform infrared spectroscopy analysis of methanolic extract of *Rosmarinus oficinalis* leaves. Journal of Pharmacognosy and Phytotherapy. 2015; 7 (6): 90-106.
16. Shareef HK, Muhammed HJ, Hussein HM, Hameed IH. Antibacterial effect of ginger (*Zingiber officinale*) roscoe and bioactive chemical analysis using gas chromatography mass spectrum. Oriental Journal of Chemistry. 2016; 32(2): 20-40.
17. Al-Jassaci MJ, Mohammed GJ, Hameed IH. Secondary Metabolites Analysis of *Saccharomyces cerievisiae* and Evaluation of Antibacterial Activity. International Journal of Pharmaceutical and Clinical Research. 2016; 8(5): 304-315.
18. Mohammed GJ, Al-Jassani MJ, Hameed IH. Anti-bacterial, Antifungal Activity and Chemical analysis of *Punica grantanum* (Pomegranate peel) using GC-MS and FTIR spectroscopy. International Journal of Pharmacognosy and Phytochemical Research. 2016; 8(3): 480-494.
19. Al-Marzoqi AH, Hadi MY, Hameed IH. Determination of metabolites products by *Cassia angustifolia* and evaluate antimicobial activity. Journal of Pharmacognosy and Phytotherapy. 2016; 8(2): 25-48.
20. Altameme HJ, Hameed IH, Abu-Serag NA. Analysis of bioactive phytochemical compounds of two medicinal plants, *Equisetum arvense* and *Alchemila valgaris* seed using gas chromatography-mass spectrometry and fourier-transform infrared spectroscopy. Malays. Appl. Biol. 2015; 44(4): 47–58.
21. Hameed IH, Hamza LF, Kamal SA. Analysis of bioactive chemical compounds of *Aspergillus niger* by using gas chromatography-mass spectrometry and fourier-transform infrared spectroscopy. Journal of Pharmacognosy and Phytotherapy. 2015;7(8): 132-163.
22. Hameed IH, Hussein HJ, Kareem MA, Hamad NS. Identification of five newly described bioactive chemical compounds in methanolic extract of *Mentha viridis* by using gas chromatography-mass spectrometry (GC-MS). Journal of Pharmacognosy and Phytotherapy. 2015; 7 (7): 107-125.
23. Hussein HM, Hameed IH, Ibraheem OA. Antimicrobial Activity and spectral chemical analysis of methanolic leaves extract of *Adiantum Capillus-Veneris* using GC-MS and FT-IR spectroscopy. *International Journal of Pharmacognosy and Phytochemical Research*. 2016; 8(3): 369-385.
24. Hussein HJ, Hadi MY, Hameed IH. Study of chemical composition of *Foeniculum vulgare* using Fourier transform infrared spectrophotometer and gas chromatography - mass spectrometry. Journal of Pharmacognosy and Phytotherapy. 2016; 8(3): 60-89.
25. Kadhim MJ, Mohammed GJ, Hameed IH. In *vitro* antibacterial, antifungal and phytochemical analysis of methanolic fruit extract of *Cassia fistula*. *Oriental Journal of Chemistry*. 2016; 32(2): 10-30.
26. Altameme HJ, Hameed IH, Idan SA, Hadi MY. Biochemical analysis of *Origanum vulgare* seeds by

fourier-transform infrared (FT-IR) spectroscopy and gas chromatography-mass spectrometry (GC-MS). Journal of Pharmacognosy and Phytotherapy. 2015; 7(9): 221-237.
27. Hussein HM. Analysis of trace heavy metals and volatile chemical compounds of *Lepidium sativum* using atomic absorption spectroscopy, gas chromatography-mass spectrometric and fourier-transform infrared spectroscopy. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2016; 7(4): 2529 – 2555.
28. Hameed IH. A new polymorphic positions discovered in mitochondrial DNA hypervariable region HVIII from central and north-central of Iraq. Mitochondrial DNA. 2016; 27(5): 3250-4.
29. Jaddoa HH, Hameed IH, Mohammed GJ. Analysis of volatile metabolites released by *Staphylococcus aureus* using gas chromatography-Mass spectrometry and determination of its antifungal activity. Oriental Journal of Chemistry. 2016; 32(4): 8-24.
30. Hameed IH, Salman HD, Mohammed GJ. Evaluation of antifungal and antibacterial activity and analysis of bioactive phytochemical compounds of *Cinnamomum zeylanicum* (Cinnamon bark) using gas chromatography-mass spectrometry. Oriental Journal of Chemistry. 2016; 32(4): 16-25.
31. Hameed IH, Jebor MA, Ommer AJ, Abdulzahra AI. Haplotype data of mitochondrial DNA coding region encompassing nucleotide positions 11,719–12,184 and evaluate the importance of these positions for forensic genetic purposes in Iraq. Mitochondrial DNA. 2016; 27(2): 1324-1327.
32. Kadhim MJ, Mohammed GJ, Hussein HM. Analysis of bioactive metabolites from *Candida albicans* using (GC-MS) and evaluation of antibacterial activity. International Journal of Pharmaceutical and Clinical Research. 2016; 8(7): 655-670.
33. Mohammad A, Imad H. Autosomal STR: From locus information to next generation sequencing technology. Research Journal of Biotechnology. 2013; 1(2): 15-23.
34. Hameed IH, Abdulzahra AI, Jebor MA, Kqueen CY. Ommer, A.J. Haplotypes and variable position detection in the mitochondrial DNA coding region encompassing nucleotide positions 10,716-11,184. Mitochondrial DNA. 2015; 3(6): 1-9.
35. Ubaid JM, Hussein HM, Hameed IH. Analysis of bioactive compounds of *Tribolium castaneum* and evaluation of anti-bacterial activity. *International Journal of Pharmaceutical and Clinical Research*. 2016; 8(7): 655-670.
36. Kadhim WA, Kadhim, M.J., Hameed, I.H. Antibacterial Activity of Several Plant Extracts Against *Proteus Species*. *International Journal of Pharmaceutical and Clinical Research*. 2017; 8(11).
37. Hameed IH, Al-Rubaye AF, Kadhim MJ. Antimicrobial Activity of Medicinal Plants and Urinary Tract Infections. *International Journal of Pharmaceutical and Clinical Research*. 2017; 9(1): 44-50.
38. Al-Rubaye AF, Hameed IH, Kadhim MJ. A Review: Uses of Gas Chromatography-Mass Spectrometry (GC-MS) Technique for Analysis of Bioactive Natural Compounds of Some Plants. *International Journal of Toxicological and Pharmacological Research*. 2017; 9(1); 81-85.
39. Kadhim MJ, Kaizal AF, Hameed IH. Medicinal Plants Used for Treatment of Rheumatoid Arthritis: A Review. International Journal of Pharmaceutical and Clinical Research 2016; 8(12): 1685-1694.
40. Ubaid JM, Kadhim MJ, Hameed IH. Study of Bioactive Methanolic Extract of *Camponotus fellah* Using Gas Chromatography – Mass Spectrum. International Journal of Toxicological and Pharmacological Research 2016; 8(6); 434-439.
41. Mohammed GJ, Kadhim MJ, Hameed IH. Proteus species: Characterization and herbal antibacterial: A review. *International Journal of Pharmacognosy and Phytochemical Research*. 2016; 8(11): 1844-1854.
42. Shireen SK, Hameed IH, Hamza LF. *Acorus calamus*: Parts used, insecticidal, anti-fungal, antitumour and anti-inflammatory activity: A review. *International Journal of Pharmaceutical Quality Assurance*. 2017; 8(3): 153-157.
43. Huda JA, Hameed IH, Hamza LF. *Anethum graveolens*: Physicochemical properties, medicinal uses, antimicrobial effects, antioxidant effect, anti-inflammatory and analgesic effects: A review. *International Journal of Pharmaceutical Quality Assurance*. 2017; 8(3): 88-91.
44. Altaee N, Kadhim MJ, Hameed IH. Detection of volatile compounds produced by *pseudomonas aeruginosa* isolated from UTI patients by gas chromatography-mass spectrometry. *International Journal of Toxicological and Pharmacological Research*. 2016; 8(6): 462-470.