

ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY OF ANACYCLUS PYRETHRUM EXTRACT

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ABSTRACT

Antibiotics (antibacterial) resistance is a series global problem and the Need for new treatment is urgent, the current antibiotics discovery model is not delivering new agent at rate that is sufficient to combat present level of antibiotic resistance. This has led to fear of the arrival of a post antibiotic era". The aim of this study was to determine the antibacterial activity of two traditionally used herbs in Iranian medicine, *Anacyclus pyrethrum*. *pyrethrum* roots were characterized by a high content in phenols and flavonoids and better antibacterial activities compared to *Anacyclus pyrethrum* var. *depressus* (Ball) Maire roots, which were characterized by better antioxidant activities. From this study, it can be concluded that the two varieties of *Anacyclus pyrethrum* (L.) showed promising mineral and chemical compositions with antioxidant and antimicrobial properties.

KEYWORDS: Anacyclus pyrethrum, medical herb, natural pesticide, pyrethrum, anti bacterial activity.

INTRODUCTION

Herbal medicinal plants are commonly used for the cure and prevention of countless diseases because of low price and more effectiveness with low side effect. The present study was conducted to test anti-bacterial activity of Pyrethrin against *Staphylococcus aureus* and *Pseudomonas*. Pyrethrum is a plant (*Chrysanthemum cinerariifolium*). Pyrethrum is also the name of the crude extract obtained from flowers of this plant. Pyrethrins are pesticides found naturally in some chrysanthemum flowers. They are a mixture of six chemicals that are toxic to insects. Pyrethrins are commonly used to control mosquitoes, fleas, flies, moths, ants, and many other pests.

Be careful not to confuse pyrethrum with pyrethrin. Pyrethrin refers to a more refined extract of pyrethrum. Pyrethrum is a plant (*Chrysanthemum cinerariifolium*). Pyrethrum is also the name of the crude extract obtained from flowers of this plant.

Antibacterial activity of different concentrations of Pyrethrin by Well- Diffusion Method. Head lice and crab lice. Applying pyrethrins to the skin in concentrations of 0.17% to 0.33% for 12-24 hours is effective for treating head lice and crab lice. Pyrethrins are usually combined with piperonyl butoxide (2% to 4%) to increase effectiveness. Knowledge of the healing properties of

medicinal plants has been transmitted over the centuries within and among human communities. Bioactive compounds produced in plant species are usually responsible for their pharmacological properties such as antidiabetic, anti-inflammatory, anticancer, and antimicrobial activities. Bacteria, fungi, and viruses are responsible for causing many infectious diseases. Pyrethrins are the six constituent compounds with insecticidal properties that occur in these *Chrysanthemum* species. Be careful not to confuse pyrethrum with pyrethrin. Pyrethrin refers to a more refined extract of pyrethrum. The pyrethrins are a class of organic compounds normally derived from *Chrysanthemum cinerariifolium* that have potent insecticidal activity by targeting the nervous systems of insects. Antibiotic therapy is facing with different problems ranging from hypersensitivity to bacterial resistance. Herbal medication is an alternative choice in treatment of different diseases. The native herbal - based medicine are easy available and non-expensive. The effectiveness of some native herbal - based medicine on *E. coli* has been shown in Africa, England and China.

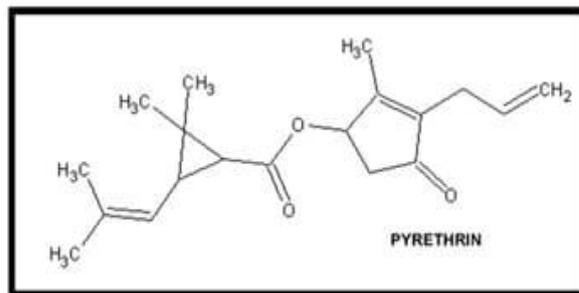
Anacyclus pyrethrum (locally known as akarkara) and *Pistacia lentiscus* L. (locally named mastaki) are traditionally used herbs in Iranian medicine by physicians such as Avicenna. *Anacyclus*

pyrethrum (pellitory) from *Anacyclus* genus is a native plant of India and Arabic countries. It has different therapeutic effects such as antimicrobial, analgesic and antioxidant activities. It has been shown that *Anacyclus pyrethrum* has antimicrobial effects on *Candida albicans*, *Staphylococcus aureus* and strong larvicidal activity against malaria. *Pyrethrum* was a genus of several Old World plants now classified as *Chrysanthemum* or *Tanacetum* (e.g., *C. coccineum*) which are cultivated as ornamentals for their showy flower heads. *Pyrethrum* continues to be used as a common name for plants formerly included in the genus *Pyrethrum*. *Pyrethrum* is also the name of a natural insecticide made from the dried flower heads of *Chrysanthemum cinerariifolium* and *Chrysanthemum coccineum*. Its active ingredient are pyrethrins. It looks more like the common daisy than other pyrethrums do. Its flowers, typically white with yellow centers, grow from numerous fairly rigid stems. Plants have blue-green leaves and grow to 45 to 100 cm (18 to 39 in) in height. The plant is economically important as a natural source of insecticide. The flowers are pulverized and the active components, called pyrethrins, contained in the seed cases, are extracted and sold in the form of an oleoresin. This is applied as a suspension in water or oil, or as a powder. Pyrethrins attack the nervous systems of all insects, and inhibit female mosquitoes from biting. When present in amounts less than those fatal to insects, they still appear to have an insect repellent effect. They are harmful to fish, but are far less toxic to mammals and birds than many synthetic insecticides and are not persistent, being biodegradable and also decompose easily on exposure to light. They are considered to be amongst the safest insecticides for use around food. Kenya produced 90% (over 6,000 tonnes) of the world's pyrethrum in 1998, called *py* for short. Production in Tanzania and Ecuador is also significant. Currently the world's major producer is Tasmanis.



Tanacetum cinerariifolium

Literature Review



Drug Name: Pyrethrin

Molecular Formula: C₂₁H₃₀O₈

Molecular Weight: 328.4 g/mol.

Pyrethrin is obtained from *Anacyclus Pyrethrum*, a species in the family *Compositae*.

Pyrethrin has been studied for its potential to treat various kind of multiple drug resistance bacterial infections as well as fungal infections.

It is also useful as Inhibiting release of acetyl choline esterase enzyme, Antidepressant, Anti-anxiolytic and Antidiabetic, Antioxidant.

MATERIAL AND METHOD

Antibacterial Activity

With the help of Well Diffusion Method we evaluating the antibacterial activity.

Bacterial strain used: *Staphylococcus aureus* and *Pseudomonas*.

Well diffusion method

Agar well diffusion method is widely used to evaluate the antimicrobial activity of plants or microbial extracts. Similarly to the procedure used in disk-diffusion method, the agar plate surface is inoculated by spreading a volume of the microbial inoculum over the entire agar surface.

Agar well diffusion method

Agar well diffusion method is widely used to evaluate the antimicrobial activity of plants or microbial extracts. Similarly to the procedure used in disk-diffusion method, the agar plate surface is inoculated by spreading a volume of the microbial inoculum over the entire agar surface. Then, a hole with a diameter of 6 to 8 mm is punched aseptically with a sterile cork borer or a tip, and a volume (20–100 μL) of the antimicrobial agent or extract solution at desired concentration is introduced into the well. Then, agar plates are incubated under suitable conditions depending upon the test microorganism. The antimicrobial agent diffuses in the agar medium and inhibits the growth of the microbial strain tested.

Antioxidant Activity

In this determination of DPPH (1,1-Diphenyl 2-picrylHydroxyl) done by the different activity study like radical scavenging, hydroxyl radical scavenging, hydrogen peroxide scavenging, determination of reducing power,

nitric oxide scavenging and assay of lipid peroxidation method is done for the in vitro study.

Antioxidant activity gives the in vitro result.

Anacyclus pyrethrum ethanolic extract was competent of scavenging the hydroxyl radical and hydrogen peroxidation in a dose dependent manner.

Phenol is a active compound found in the screening of anacyclus pyrethrum.

Due to the presence of phenoilic compound nitric oxide have scavenging effect and the scavenging activity of EEAP increase dose dependent manner.

The result of reducing power it found that it is increase with increased concentration of the test compound.

CONCLUSION

Academia has an essential role to play as there is still much to learn about bacterial physiology to benefit the field of antibiotic R&D. This can be achieved by employing a systems biology approach to understand potential targets and deepen our knowledge of the permeability barrier and multidrug efflux exhibited by Gram-negative bacteria. A new paradigm for preclinical research has been proposed that should aid those engaged in early drug discovery. However, early discovery research should be in partnership with SMEs and large companies and not in isolation in academia. Otherwise, there is the danger of spending considerable time and funding on research that will never deliver a new drug.

The natural world remains the largest source of novel drug scaffolds making this a viable option in the search for new antibiotic compounds. Advances in bacterial culture techniques, The methanolic extract of *Anacyclus pyrethrum* and *Pistacia lentiscus* L. have antibacterial effect on *Escherichia coli* bacteria. This activity is dose-dependent.

REFERENCES

- Dias D.A., Urban S., Roessner U. A Historical Overview of Natural Products in Drug Discovery. *Metabolites*, 2012.
- Mushtaq S., Abbasi B.H., Uzair B., Abbasi R. Natural products as reservoirs of novel therapeutic agents. [(accessed on 5 October 2020)]
- Cole L., Kramer P.R. *Human Physiology, Biochemistry and Basic Medicine*. Elsevier; Amsterdam, The Netherlands: 2016.
- Toxicological profile for pyrethrins and pyrethroids. Draft. P.147-150. Dept. of Health and Human Services.
- Federal Insecticide, Fungicide, and Rodenticide Act Sec. 2.40 Code of Federal Regulations 158.340.
- Cavaliyyo, cBailey, JH. pyrethrin, the antibacterial principle of Pyrethrin solation, physical properties and antibacterial action AM Chem Soc66(1994).
- Cellini L, DiCampli B, Masulli M, Di Bartolomeo S, Aliocati N, Inhibitor of *Helicobacter pylori* by pyrethrum extract (*Anacyclus pyrethrum*), FEM Immenol Med Microbiol, 1996; 13: 273-277.
- Elmore, GS, Feldberg, RS, Allicinlyase localization in bundle sheath of the methanolic extract of pyrethrum Am J Bot, 1994; 81: 89-94.
- Onyechi J.O., Chime S. A, Onyishi I.V. Brown S. A. Eleigwe P.O. Onunkwo G.C. department of pharmaceutical technology and industrial pharmacy, university of Nigeria, Nsukka 410001, Nigeria.
- Wara, A.A, Gunu, S.Y., Jega A., & Aisha. J. A. (2011). Soap Production. from shea nut Butter. International Journal of Applied Science, 5, 4: 410-412.
- Anacyclus pyrethrum var. pyrethrum (L.) and Anacyclus pyrethrum var. depressus (Ball) Maire: Correlation between Total Phenolic and Flavonoid Contents with Antioxidant and Antimicrobial Activities of Chemically Characterized Extracts. Jawhari FZ, Moussaoui AEL, Bourhia M, Imtara H, Saghrouchni H, Ammor K, Ouassou H, Elamine Y, Ullah R, Ezzeldin E, Mostafa GAE, Bari A.
- S. Magaldi, S. Mata-Essayag, C. Hartung de Capriles, *et al.* Well diffusion for antifungal susceptibility testing Int. J. Infect. Dis., 2004; 8: 39-45.
- C. Valgas, S.M. De Souza, E.F.A. Smânia, *et al.*
- Screening methods to determine antibacterial activity of natural products Braz. J. Microbiol., 2007; 38: 369-380.
- Sharafkandi A. (Abu Ali Sina) (2004). *Ganon* 5th ed Soroush, Tehran: pp. 338–358. (In Persian)
- Usmani A, Khushtar M, Muhammad Arif, Siddiqui M.A, Prakash Sing S, Mujahid M. Pharmacognostic and phytopharmacology study of *Anacyclus pyrethrum*: An insight. *J App Pharm Sci.*, 2016; 6: 144–150.
- Sujith K, Ronald Darwin C, Suba V. Antioxidant activity of ethanolic root extract of *Anacyclus pyrethrum*. *Int Res J Pharm*, 2011; 2: 222–226.
- Pandey V, Agrawal V, Raghavendra K, Dash AP. Strong larvicidal activity of three species of *Spilanthus* (Akarkara) against malaria (*Anopheles stephensi* Liston, *Anopheles culicifacies*, species C) and filaria vector (*Culex quinquefasciatus* Say). *Parasitol Res.*, 2007; 102: 171–174.
- Selles C, Dib Mel A, Djabou N, Beddou F, Muselli A, Tabti B, *et al.* Antimicrobial activity and evolution of the composition of essential oil from Algerian *Anacyclus pyrethrum* L. through the vegetative cycle. *Nat Prod Res.*, 2013; 27: 2231–2234.
- Zargari A. *Medicinal plants*. 4th ed Tehran: Tehran University Publications; 1985: 569–71. (In Persian)
- Singleton P. (1999). *Bacteria in Biology, Biotechnology and Medicine*. Wiley, Hoboken: pp. 444–454.

21. Singleton P. (1999). *Bacteria in Biology, Biotechnology and Medicine*. Wiley, Hoboken: pp. 444–454.
22. Abduzaimovic A, Aljicevic M, Rebic V, Vranic SM, Abduzaimovic K, Sestic S. Antibiotic resistance in urinary isolates of *Escherichia coli*. *Mater Sociomed*, 2016; 28: 416–419.
23. Brooks GF, Carroll KC, Butel JS, Morse SA, Mietzner TA. (2010). In: *Jawetz, Melnick, & Adelberg's Medical Microbiology*. New York: McGraw-Hill, 217–218, 354.
24. Zonyane S, Van Vuuren SF, Makunga NP. Antimicrobial interactions of Khoi-San poly-herbal remedies with emphasis on the combination; *Agathosma crenulata*, *Dodonaea viscosa* and *Eucalyptus globulus*. *J Ethnopharmacol*, 2013; 148: 144–151.