

## Antibacterial activity of Saponins extract from Sider (Ziziphus spina\_christi)

Husam M. Kredy

College of sciences , University of Thi-Qar

Thi-Qar, Iraq

### Abstract

Saponin extract from Sider ( Ziziphus spina\_christi ) were evaluated for his antibacterial activity against gram negative bacteria like E.coli , Proteus mirabilis and gram positive like Staphylococcus aureus, Streptococcus pneumoniae. The inhibitory effect in vitro was defined to appare inhibition zone around the paper disc [paper disc method].The study revealed that 30% (w/ v) concentration most active against bacteria.

### الخلاصة:

المركبات الصابونية الخام المستخلصة من نبات السدر تمتلك تأثير مضاد للبكتريا السالبة لصيغة غرام مثل. E.coli , Proteus mirabilis ولها تأثير مضاد لبكتريا الموجبة للصيغة Staphylococcus aureus , Streptococcus pneumoniae . ان التأثير المضاد الذي ظهر مختبريا يعرف بظهور منطقة التثبيط حول القرص الورقي (حيث القرص محضر بطريقة الأقراص الورقية وقد اظهرت الدراسة ان تركيز 30% (w/ v) هو أعلى تأثير مضاد للبكتريا .

## **Introduction**

Undoubtedly medicinal plants are relevant in both developing developed nations of the world as sources of drugs or herbal extracts for various chemotherapeutic purposes. Also the use of plant derived natural compounds as part of herbal preparations as alternative sources of medicaments continues to play major roles in the general wellness of people all over the world (1). Natural products play an important role in drug development programs of the pharmaceutical industry (2). Sider (*Ziziphus spina-christi*) plant more distribution in south and middle of Iraq and used in folk medicine (3,4,5). It contains saponin compounds (4). Saponins are high-molecular-weight glycosides, sugar moiety linked to a triterpene or steroid aglycone. The classical definition of saponins is based on their surface activity; many saponins have detergent properties, give stable foams in water, show haemolytic activity, have a bitter taste and are toxic to fish (piscicidal). Such attributes, while not common to all saponins, have frequently been used to characterize this class of natural products. However, because of the numerous exceptions which exist, saponins are now more conveniently defined on basis of their molecular structure, namely as triterpene or steroid glycosides (6, 7). Saponins are glycosylated triterpenoid, steroid, or steroidal alkaloid molecules which occur constitutively in a great many plant species (8, 9, 10, 11). These molecules have an oligosaccharide chain (6). The aim of the present study was to evaluate antibacterial activity of saponin extract from leaves (inedible) of Sider (*Z.spina-christi*) against bacterial pathogens.

## **Plant material**

Leaves of Sider (*Z.spina-christi*) were collected in January, 2005 in Nassriya, Iraq

## **Extraction of crude from plant**

Air-dried powdered leaves of Sider (550 g) was extracted with 70% Ethanol (EtOH) (24h x 600 mL) at room temperature. The EtOH solution was concentrate to a small volume (150 mL) by low-pressure evaporation at <50 OC and extracted in succession with chloroform (24h x 100ml) and n-Butanol (24h x 100 mL) .The n-BuOH layer was concentrated to dryness giving the saponins extract (8.5g) (12, 13).

## **Tests of saponin compounds**

- (1) Aqueous solution of saponin extract has been prepared in test tube and shake after that produced soapsuds was stay for long time .
- (2) 5 mL from aqueous solution of saponin extract in test tube and added 5 mL from ammonia silver nitrate after that put in water bath at 100OC (5 minutes) when test tube cooled produced silver mirror on inner surface of the test tube (14).

## **Antibacterial assay**

### **Paper disc method**

The disc made from filter paper (whatman No1) have 5 mm diameter and sterilized by autoclave after that soaked in aqueuouse solution have concentration (10%,20% and 30% w/ v) of crud saponin extract then placed on the surface of the agar medium .The inhibition zone around the paper disc was measured (15, 16).

## **Results and Discussion**

The results of test saponins in crude extracts from leaves of sider give stable foams in water for long time and the second test produced silver mirror on inner surface of the test tube. Saponins have shown activity against a broad range of microorganisms including bacteria, filamentous fingi and yeasts (17,

18). The results of antibacterial activity are presented in table (1) and table (2), which summarize the inhibition zone around the paper disc measured by diameter. The concentration 30 % (w/ v) were more effective inhibition zone of Gram negative bacteria like E-coli , Proteus mirabilis and Gram positive like Staphylococcus aureus , Streptococcus pneumoniae . But concentration 10 % (w/ v) did not have inhibit effective both Gram negative and Gram positive. In concentration 20 % (w/ v) just Staph.aureus and E-coli .This study agreement with Kabir et al (19), Tschessche (20).We can use this study for development new antibacterial for need when some bacterial pathogen resistant to available antibiotal agents.Sider (*Z.spina-chrisit*) plant more distribution in south and middle of Iraq and used in folk medicine (3, 4), can help for make when new antibacterial cheap cost by use inedible portions of Sider will increase the utilisation of the region's natural resources. When can isolation compounds of saponin from crude after that found which compound has highly biological activity, this is extract broad spectrum activity on both gram negative and gram positive.

**Table (1) Diameter inhibition zone (mm) of Gram<sup>-ve</sup> Bacteria**

| Type of bacteria           | Concentration of extract (w/ v) |       |     |
|----------------------------|---------------------------------|-------|-----|
|                            | %٣٠                             | %٢٠   | %10 |
| <i>E.coli</i>              | 15 mm                           | 11 mm | --  |
| <i>Pseudomon,aenginosa</i> | --                              | --    | --  |
| <i>Proteus mirabilis</i>   | 9mm                             | --    | --  |

**Table (2) Diameter inhibition zone (mm) of Gram<sup>+ve</sup> Bacteria**

| Type of bacteria        | Concentration of extract (w/ v) |       |     |
|-------------------------|---------------------------------|-------|-----|
|                         | %٣٠                             | %٢٠   | %10 |
| <i>Staph .aureus</i>    | 15 mm                           | 11 mm | --  |
| <i>Strep pyogenes</i>   | --                              | --    | --  |
| <i>Strep,pneumoniae</i> | 11 mm                           | --    | --  |

**Note: -- no inhibition zone.**

## **References:-**

- 1- Olatunde E. F. (2003). African indigenous plants with chemotherapeutic potentials and biotechnological approach to the production of bioactive prophylactic agents . African Journal of Biotechnology Vol. 2, (12): 662-671.
- 2- Backer J.T. , Borris R.P., Cate B., cordell G.A., Soejarto D.D., Cragg G.M., Gupta M.P., Iwu M.M., Madulid D.R., Tyler V.E. (1995). Natural product drug discovery and development new perspective on international collaboration .J.Nat. prod .58:1325-1357.
- 3- Al-Rawi A. and Chakravarty H.L. (1964). Medicinal plants of Iraq 2nd. Ed. Ministry of Agriculture, Baghdad. 98-99.
- 4- Duke J.A. and Ayensu E.S. (1985) Medicinal plants of China 2:537-540
- 5- Hussian S.M. and Kasim M.H.(1975). Cultivated plants of Iraq. Uni.Mousl.press.275.
- 6- Hostettmann, K. and Marston A.(1995).Chemistry and pharmacology of natural products Saponins , Cambridge University Press, Cambridge , United Kingdom.1-2.
- 7- Oleszek W. and Marston A. (2000). Saponins in food feedstuffs and medicinal plants. Kluwer academic publishers, Dordrecht, Boston, London.13-23.
- 8- Hostettmann, K.A. and Marston A. (1995). Saponins. Chemistry and pharmacology of natural products. Cambridge University Press, Cambridge, United Kingdom. 239-284.
- 9- Osbourn, A. E. (1996). Saponins and plant defence—a soap story. Trends Plant Sci. 1:4-9.
- 10- Price K. R., Johnson I. T., Fenwick G. R. (1987). The chemistry and biological significance of saponins in food and feeding stuffs. Crit. Rev. Food Sci. Nutr. 26:27-133
- 11- Morrissey J.P. and Osbourn A.E. (1999). Fungal resistance to plant antibiotics as mechanism of pathogenesis .Microbiol .Mol.Biol.Rev.63:708-724.

- 12- Ivan kostova, Dragomir D., Gudrun H. R., Vladimir D., Antoaneta I. (2002). Two new sulfated furostanol saponins from *Tribulus terrestris*. *Zeitschrift Naturforsch* 57c. 33-38
- 13- Flavio H.R., Carla K., Jan S. ,Dominique G., Grace G., Eloir P.S.(2001).Steroidal and triterpenoidal glucosides from *Passiflora alata*.*J.Braz.Chem.Soc.vol.12, (1): 32-36.*
- 14- Shihata I.M.(1951).Apharmacological study of *anagallis arvensis* ‘ M.D.vet.Thesis.Cairo University.
- 15- Adday M., Rshan L.J., Sulayman K.D. (1989) . Antimicrobial activity of different extracts from the seeds of *penganum harmula* . *phytoth rep.* 4: 363-366.
- 16- Kady I.A., El-Maraghy S.S., Mohamed I.M. (1993). Antibacterial and antidermatophte activities of some essential oils from spices. *Qatar Univ.sci.J.* 13:63-69.
- 17- Lacaille-Dubois M.A. and Wagner H. (1996). A review of the biological and pharmacological activities of saponins. *Phytomedicine.* 4: 363-386.
- 18- Lacaille-Dubois M.A. and Wagner H. (1999).Bioactive saponins from plant: anupdate, in *atta-ur-Raman(ed.),Studies in natural products chemistry of organic natural products*.Springer,Wien,New York,74,1-196.
- 19- Kabir O.A., Olukayode O., Chidi E.O., Christopher C., Kehinde A. F.(2005). Screening of crude extracts of six medicinal plants used in South-West Nigerian unorthodox medicine for anti-methicillin resistant *Staphylococcus aureus* activity. *BMC Complementary and Alternative Medicine.* 5 -6.
- 20- Tschesche R.( 1971). Advances in the chemistry of antibiotics substances from higher plants:Pharmacognosy and phytochemistry.In *Proceeding of the 1st International Congress,Murich,1970* Edited by:Wagner H,Horharmmer L.Springer-Verlag,Berlin Heidelberg,New York.274-289.