The Antibacterial activity of Aqueous Extraction of Petroselinum crispum(Parsley) and Rhus glabra (Smooth sumac)

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Abstract

Throughout history, Parsley Teas have been used mainly as kidney stone, bladder infection, and jaundice medications, as well as digestive aids. Smooth sumac used to treat a large number of ailments, particularly mouth and throat sores, burns, to control diarrhea, and to promote urination.

The Antibacterial activity of parsley (Petroselinum crispum) and Smooth Sumac (Rhus glabra) leaves aqueous extract were examined using agar disc diffusion methods against six bacteria (*Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Proteus mirabilis, Klebsiella pneumonia , Pseudomonas aeruginsa*) . The extract of both plants had inhibitory effect at various concentration (4%,5%,7%) for sumac and (1.5%, 2%) for Parsley against both Gram(+) and Gram(-). Based on these results of this study both plants could be considered as potential antibacterial agents which confirms their use in folk Medicine .

Rhus glabra (Smooth sumac)

petroselinum crispum(Parsley)

Intreuduction

Plants remain the most common source of antimicrobial agents. Their usage as traditional health remedies is the most popular for 80% of world population in Asia, Latin America and Africa and is reported to have minimal side effects (Doughari, 2006). Infectious diseases account for about half of the death in tropical countries (Khosravi and Behzadi, 2006). Besides, incidents of epidemics due to drug resistant microorganisms pose enormous public health concerns (Burt and Reinders, 2003). Many studies indicates that in some plants there are many substances such as peptides, unsaturated long chain aldehydes, alkaloidal constituents, some essential oils, phenols and water, ethanol, chloroform, methanol and butanol soluble compounds (Klausmeyer *et al*., 2004). These plants then emerged as compounds with potentially significant therapeutic application against human pathogens, including bacteria, fungi or viruses (Perez, 2003).

Material and Methods

Extract preparation

-Parsely was obtained from the local market. Rhus glabra (smooth sumac) leaves were collected from plants grown in mountains in North of Palestine.

-The Leaves of parsley were dried, grinded and soaked in distilled water at concentration of 5% for 24 h then filtered and sterilized by filtration and stored in freezer

-Dry Leaves of Rhus glabra (smooth sumac) were grinded and soaked in distilled water for 72 h, filtered, sterilized by filtration and stored in freezer at final concentration of 7 %.

Test Bacteria

-A total of six bacteria species were tested. The gram positive bacterial were *Bacillus subtilis , Staphylococcus aureus* and The Gram negative species were, *Escherichia coli, Proteus mirabilis , Klebsiella pneumonia , Pseudomonas aeruginsa*). These species were originally isolated from clinical materials collected from patients. There were identified using standard Biochemical tests

Determination of antimicrobial activity:

-Antimicrobial activity of the extracts of both plant sample was evaluated by the paper disc diffusion method (Sagdic and Ozcan, 2003).

-Stock culture of test bacteria were grown in TSB medium at 37°C for 22 h. Final cell concentrations were 10^8 cfu mL^{-1} with reference to the Mc Farland turbidometry (Burt and Reinders, 2003).

-One milliliter of this inoculum was added to each plate containing Mueller-Hinton agar (MHA, Oxoid) spread by sterile cotton swab and allowed to remain in contact for 1 min.

-Four concentrations of Smooth Sumac (2.5, 4, 5, 7 %) and (0.5, 1 , 1.5, 2 %) of parsley were prepared.

-Sterile 6 mm filter paper discs (Hsieh *et al*., 2001) were placed on these cultures and immediately 50 µL volumes of the each concentration from the two mentioned extracts were added.

-The plates allowed to remain 1 h at room temperature in order to diffusing the extract across the surface and then were incubated at 37°C for 24 h.

-The inhibition zone around each disc was measured in millimeter.

- Discs containing different concentrations of two antibiotics (Tetracycline 30 mcg, Gentamycin mcg,) served as positive controls..

Results

Effects of Parsely extract

The antibacterial activity of the parsley extracts was quantitatively assessed by the presence or absence of inhibition zone and measuring the diameter of the inhibition zone around the discs. Results showed the antibacterial activity of the tested extracts against test bacteria (Table 1).

The results show in Table 1 indicate that parsley aqueous extract had inhibitory effect at various concentrations against Gram-positive and Gram-negative bacteria. Also it was effective in lower concentrations on *E. coli*,. The extract of parsley inhibit the growth of *Proteus mirabilis* only at higher concentration

Name of bacteria	.5%	1%	1.5%	2%	**Antibiotic Gentamycin (30 µg)**
Pseudomonas aeruginosa	R	R	12	15	R
Staphylococcus aureus.	R	R	14	16	24
Bacillus	R	10	12	17	19
Escherichia coli	R	10	16	18	20
Proteus mirabils	R	R	R	12	25
Kebsiella	R	8	10	12	20

Table2: Inhibition zone (mm)* of *Parsley* aqueous extracts at various concentrations on some bacterial species

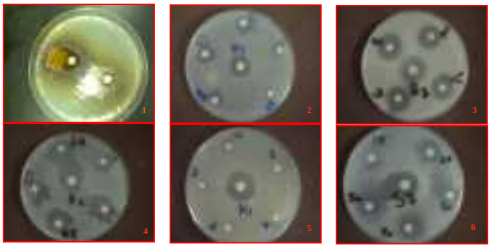

Figure2: Inhibition zone (of Parsley aqueous extracts at various concentrations on some bacterial species: *1) Pseudomonas, 2) Staphylococcus aureus, 3) Bacillus subtilis, 4) E coli, 5) Proteus mirabilis 6) Klebsiella*

These results suggesting that antibacterial activity of *parsley* aqueous extract against *bacterial species used in the experiment. This activity* was decreased when used in lower concentrations. However, *E coli* was the most susceptible organism to the different concentrations of the aqueous parsley extract.

Effect of Smooth Sumac

The antibacterial activity of the Smooth sumac extracts was quantitatively assessed by the presence or absence of inhibition zone and measuring the diameter of the inhibition zone around the discs. Results showed the antibacterial activity of the tested extracts against test bacteria (Table 2).

Name of bacteria	2.5%	4%	5%	7%	**Antibiotic Tetracyclin (30 µg)**
Pseudomonas aeruginosa	R	16	18	18	12
Staphylococcus aureus.	R	10	12	13	28
Bacillus	R	12	13	14	14
Escherichia coli	R	15	18	25	35
Proteus mirabilis	R	10	11	12	25
Kebsiella	R	R	12	16	26

Table2: Inhibition zone (mm)* of *Smooth sumac* aqueous extracts at various concentrations on some bacterial species

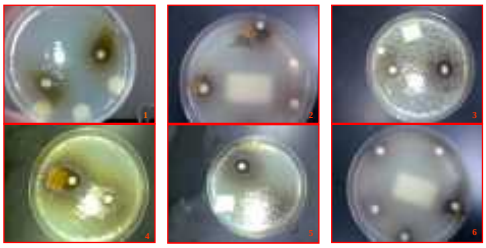

Figure2: Inhibition zone (of *Smooth sumac* aqueous extracts at various concentrations on some bacterial species: *1) Pseudomonas 2) Staphylococcus aureus., 3) Bacillus subtilis, 4) E coli, 5) Proteus mirabilis 6) Klebsiella*

Discussion

Parallel to increasing the resistance of microorganisms to the currently used antibiotics and the high cost of production of synthetic compounds, pharmaceutical companies are now looking for alternatives. Medicinal plants could be one approach because most of them are safe with little side effects if any, cost less and affect a wide range of antibiotic resistant microorganisms. The results of this study showed that aqueous extracts from the parsley and *Smooth sumac* inhibited the growth of various species of Gram-positive and Gram-negative bacteria.

Smooth sumac and Parsley extract at (7%) for sumac and (2%) for parsley showed significant effect on *E coli and Proteus*. In hospitals, *E coli and Proteus mirabilis* are the most frequently isolated bacteria from *Enterobacteriaceae* (Champs *et al*., 2000).

Based on the results of this study we will further investigate the plants that showed broad antibacterial activities *in vivo* to uncover their potential as a source of antibiotics against selected human pathogens. The active plant extracts could also be considered as disinfectants or antiseptics.

Referances

-Doughari, J.H., 2006. Antimicrobial activity of *Tamarindus indica* Linn. Trop. J. Pharm. Res., 5: 597-603

-Khosravi, A. and A. Behzadi, 2006. Evaluation of the antibacterial activity of the seed hull of *Quercus barantii* on some gram-negative bacteria. Pak. J. Med. Sci., 22: 429-432

-Burt, A.S. and R.D. Reinders, 2003. Antibacterial activity of selected plant essential oils against *Escherichia coli* O157:H7. Lett. Applied Microbiol., 36: 162-167.

-Klausmeyer, P., G.N. Chmurny, T.G. McCloud, K.D. Tucker and R.H. Shoemaker, 2004. A novel antimicrobial indolizinium alkaloid from *Aniba panurensis*. J. Nat. Prod., 67: 1732-1735.

-Perez, R.M., 2003. Antiviral activity of compounds isolated from plants. Pharma. Biol., 41: 107-157

-Sagdic, O. and M. Ozcan, 2003. Antibacterial activity of Turkish spice hydrosols. J. Food. Cont., 14: 141-143.

-Champs, C.de., R. Bonnet, D. Sirot, C. Chanal and J. Sirot, 2000. Clinical relevance of *Proteus mirabilis* in hospital patients: A two year survey. J. Antimicrob. Chemother., 45: 537-539.

-Hsieh, P.C., J.L. Mau and S.H. Huang, 2001. Antimicrobial effect of various combinations of plant extracts. Food Microbiol., 18: 35-43.