STUDY THE ANTIBACTERIAL POTENTIAL OF *SONCHUS OLERACEUS* L. COLLECTED FROM SAMAHNI, AZAD KASHMIR

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ABSTRACT

Medicinal plants are the major source of the therapeutic compounds for the medicinal use. The current research work was conducted to evaluate the medicinal potential of *Sonchus oleraceus* L, collected from Samahni, District Bhimber Azad Kashmir. In present study methanolic, chloroform, acetone and petroleum ether extract of *Sonchus oleraceus* L. were screened for their antibacterial activity. The activity was checked by the disc diffusion method. The antibacterial activity of all the extracts were checked against five bacterial strains, collected from the Postgraduate Laboratory, Department of Biotechnology, Mirpur University of Science and Technology (MUST), Mirpur AJK. The strains include *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus pumilus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The highest antibacterial activity of all four extracts was recorded against *Staphylococcus aureus*, with highest in methanolic extract (12.9±04mm). Study showed the presence of antibacterial properties in *Sonchus oleraceus* L. which can be utilized to make novel drugs in pharmaceuticals industries for humans and animals.

Keywords: *Sonchus oleraceus* L; medicinal plant; antibacterial; antioxidant

INTRODUCTION

Medicinal plants are simply those plants that can be used for therapeutic purposes. In a more detailed explanation, these are plants that have been confirmed and utilized as traditional medicines over a long period, have been significantly recognized for their medicinal properties in latest research and contain therapeutic compounds (Hamilton and Buell, 2012). Before the advent of pharmaceuticals drugs, humans depended on the medicinal characteristics of plants for rehabilitation. Some people cherish medicinal plants because of traditional belief that they were produced for providing food, medical remedies and other benefits. Medicinal plants serve as the foundation of traditional medicine, which means that over 3.3 billion people in underdeveloped countries regularly use medicinal plants (Davidson-Hunt, 2000).

The World Health Organization (WHO) approximated that 80% of the populations in underdeveloped countries rely on plant based medicines for their primary healthcare. According to survey by World Health Organization (WHO) traditional medicines experts treat approximately 8% of the patients in India, 85% in Burma and 90% in Bangladesh (Gireesha and Raju, 2013). There are approximately 265,000 species of the seed plants on earth and less than half of these have undergone systematic research to explore their chemical composition and medicinal potential (Sathiyaraj et al., 2015).

Medicinal plants are currently receiving more attention than ever before because they have potential to provide a lot of benefits to society in medical field (Edeogo *et al*., 2005). The natural compounds found in higher plants may provide a new source of antimicrobial agents which could potentially have unique mechanism of action (Shahidi, 2004). Natural plant based compounds exhibit a variety of intriguing biological properties including antioxidant, antibacterial, anti-inflammatory, antipyretic and gastro-protective actions and can serve as models for the development of new pharmaceuticals. All plant parts including the leaf, stem, flower, bark, fruit, peel, rhizome, essential oil, latex, and bud among others can be utilized as herbal medicines. Plants have medical benefits because of phytochemicals they contain, which have defined physiological effects on people. Numerous phytochemicals including tannins, flavonoids, phenolic compounds, glycosides, steroids, saponins are produced by plants and accumulate in their cells. The majority of these are strong bioactive substances that can be used to create beneficial medicines. Though the active principles vary from plant to plant due to their different biochemical composition, phytochemicals regulate, protect and control numerous human diseases (Hill, 1952).

The World Health Organization (WHO) has been using traditional medicines for the last twelve years or so, while the rest of world has been using it for at least a few thousand years. We may claim that the game is new to us. The use of traditional medicines is common throughout the world. It includes belief based practices that were common place before the creation and transmission of modern scientific medicines and are still in use today, frequently for thousands of years. As it name suggest, it uses custom that have been passed down from generation to

generation and is part of every nation's tradition. A major portion of traditional medicines may consequently be unaccepted by a population due to cultural considerations. In dealing with traditional medicine WHO seeks to take advantage of its component that offer secure and efficient treatment for use in primary healthcare (WHO, 2005).

Sonchus oleraceus L. is an annual herb that belongs to the weed family Asteraceae. It's origin is Europe, North Africa and West Asia. It has expanded to North and South America, Southern Australia, India and China (Chauhan et al., 2006). There are several historical medical system notably Chinese medicine that use *S.oleraceus* species. The entire *S.olereceus* L. plant particularly the aerial parts include a number of pharmacologically active components that can be used to treat a variety of illness problems (Bent, 2008). About 60 species make up the genus *Sonchus* and three of them have spread like weeds throughout the world. Two of these are annual species, *S.oleraceus* L. (common sow thistle) and *Sonchus asper* L. (spiny sow thistle) and other is *Sonchus arvensis* L. (perennial sow thistle). In traditional medicine *S.oleraceus* L. is used to treat ailments like enteritis diarrhea, pneumonia, hepatitis, appendicitis, chronic bronchopneumonia, icterus, throat swelling, hematemesis and uremia (Jing and Yan, 2005).

Low molecular weight antioxidants which are effective at preventing illness because of their high antioxidant activity are usually abundant in a vegetative shoots of *S.oleraceus* L. (Mawalagedera, 2014). Additionally *S.oleraceus* L. includes coumarins, flavonoids and saponins such as taraxasterol, apigenin-7-glucuronide and luteolin-7-glucoside (Ghazanfar, 1994). Consequently the plant or its extracts had potent anti-inflammatory, antibacterial and antioxidant activities (Jimoh et al., 2011; Ou et al., 2015).

MATERIAL AND METHODS

The antibacterial activity of medicinal plant *Sonchus oleraceus* L. was conducted against different bacterial strains in the laboratory of Mirpur University of Science and Technology, Azad Jammu and Kashmir (AJK).

Collection of plant material

Fresh plants of *Sonchus oleraceus* L. were collected from Samahni, Azad Kashmir in the month of February 2023 and identified with the help of Flora of Pakistan. After collection the plants were washed with tap water to remove the dust particles. Then plants were cut into small pieces and left for several days under shade for drying. After drying these plants were ground into fine powder by using a grinder for further processes.

Preparation of plant extracts

For the preparation of plant extracts plant sample was macerated in organic solvents. Powdered sample of plant was weighed around 250g and put into separate flasks each containing different solvents named as: petroleum ether, methanol, acetone and chloroform. The flasks were left in

the dark at room temperature for seven days, shaking and stirring occasionally to ensure good extraction.

Filtration

The plant extracts were filtered after seven days of maceration and kept separately in labeled beakers. Filtered extracts were left at room temperature to allow the solvent to evaporate. Then the dried extracts were weighed and kept at 4ºC.

Making Extract Dilution

The dried plant extracts were weighed again and dissolved in their respective solvents in 100mg/ml concentration.

Determination of antibacterial activity

Both gram positive and gram negative bacterial strains were used to perform antibacterial activity. The bacterial strains of *Bacillus subtilis, Bacillus pumilus, Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa* were used.

Media Preparation

LB broth and agar media were used to perform antibacterial activity.

LB Broth Preparation

To prepare LB broth I took 1g of trypton, 0.5g yeast extract, 0.5g NaCl in a flask and dissolved it well in 100ml of distilled water then autoclaved at 121ºC for 15 minutes.

Nutrient Agar Preparation

To prepare nutrient agar we took 1.5g agar, 1g trypton, 0.5g yeast extract, 0.5g NaCl and dissolved it well in 100ml of distilled water then autoclaved it at 121ºC for 15 minutes.

Preparation of Bacterial Culture

Took five falcon tubes and labeled with all five bacterial strains. Poured 20ml LB broth media in each falcon tube and then added 20µl G stock solution in each tube. All the falcon tubes were left in shaking incubator for 24 hours at 37ºC for the best growth of bacterial strains.

Preparation of Dried Filter Paper Discs

Whattman filter paper No.1 was used to make discs around 6mm in diameter that were utilized to test the antibacterial potential of plant extracts.

Disc Diffusion Method

To assess the antibacterial activity of plant extracts against the bacterial strains used the agar disc diffusion method was performed. Took five sterilized glass petri plates for five bacterial strains. Each plate contained 100µl bacterial culture. Then the sterilized nutrient agar medium was placed into petri plates containing bacterial suspension. Then petri plates were left for about 30 minutes to solidify the media. Sterilized paper discs were immersed in plant extracts and placed in their specified positions in petri plates after medium solidification. Rifampicin antibiotic was used as positive control. The antibiotic rifampicin was diluted to 1 percent and placed in the center of petri plates. Petri plates were sealed with parafilm and incubated at room temperature for 2 hours. Then all the plates were incubated at 37ºC for 24 hours.

Measurement of Zone of Inhibition

After 24 hours zones of inhibition were measured in mm by using a scale. The zones of inhibition values were expressed as mean ± standard error of mean.

RESULTS AND DISCUSSION

In the present study antibacterial activity of *Sonchus oleraceus* L. was recorded against *B. subtilis. B. pumilus, S. aureus, E. coli* and *P. aeruginosa* by using disc diffusion method.Four solvents; acetone, methanol, chloroform and petroleum ether were used. Rifampicin was used as standard antibiotic. Plant extracts showed variable antibacterial activity against selected bacterial strains.The standard antibiotic rifampicin exhibited highest inhibitory effect against *S. aureus* and least inhibitory effect against *P. aeruginosa.* The antibacterial activity of all samples of *Sonchus oleraceus* L. against five bacterial strains are presented in Table1 and Fig.1.

Table 1: Antibacterial activity of extracts of *Sonchus oleraceus* L. against bacterial strains.

Zone of Inhibition [Mean ± Standard Error of Mean (mm)]					
Bacterial Strains	**Acetone**	**Chloroform**	**Methanol**	**Petroleum Ether**	**Rifampicin**
S. aureus	9.4±0.2	8.9±0.4	12.9±04	7.4±0.25	19.4±0.8
B. subtilus	7.6±0.4	6.4±0.25	9.2±0.8	5.6±0.4	17.2±0.5
B. pumilus	7.8±0.79	7.3±0.2	8.8±0.75	6.2±0.7	18.3±0.2
P.aeruginosa	4.7±0.2	5.9±0.38	6.3±0.2	4.6±0.4	15.4±0.25
E. coli	7.2±0.2	5.7±0.2	7.4±0.02	5.2±0.8	16.3±0.7

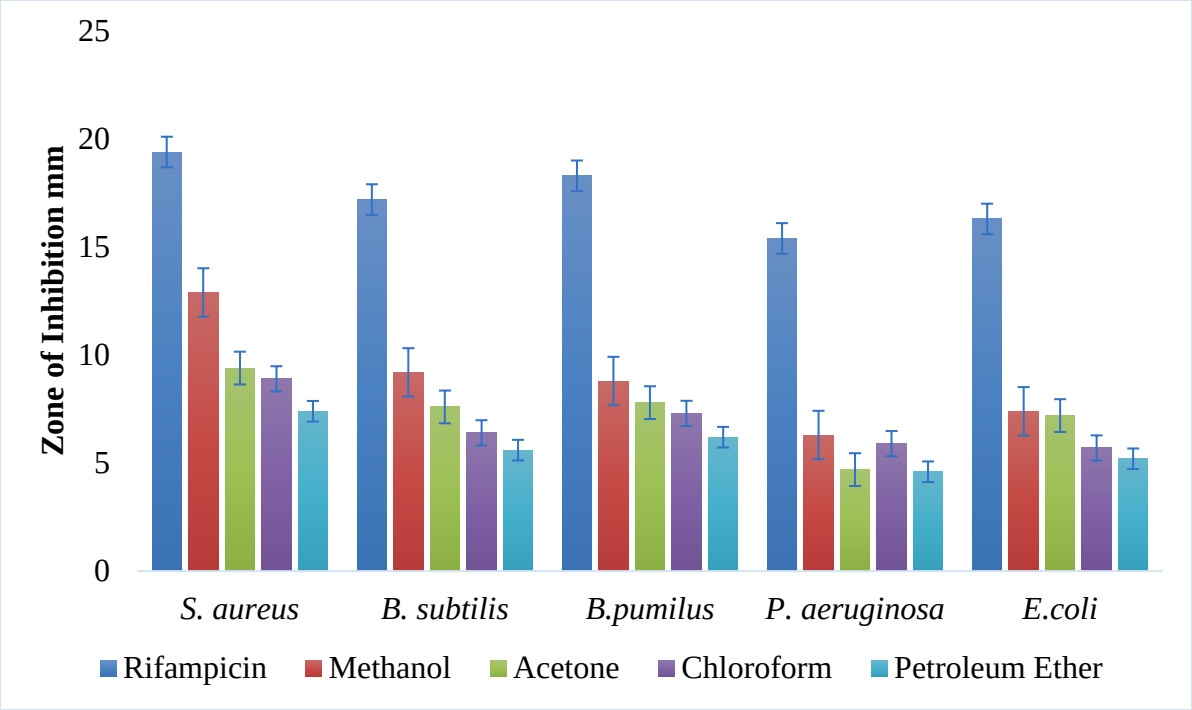

Figure 1: Antibacterial activity of extracts of *Sonchus oleraceus* L.

Majority of the harmful bacteria have become resistant to currently available antibiotics because of their overuse or misuse. Due to this circumstance it is now critically necessary to explore several sources for the creation of effective, less hazardous and affordable antimicrobial agents (Russel, 1999; Sheldon, 2005). The foundation of traditional medicine is made up primarily of medicinal plants. 80% of populations in underdeveloped countries according to estimates from WHO only receive their medical needs through traditional medical treatment. Additionally, 20% of allopathic medications on the market have an active ingredients derived from higher plants (Manisha and Tandon, 2004; Dhiman, 2006; Hota, 2007). The World Health Organization (WHO) acknowledged the value of native medicinal plants when it published a guideline in 1997 recommending the use of "effective locally available plants as substitute for drugs". The scientific study of medicinal plants for human benefits and the exchange of knowledge gained from such research would undoubtedly reduce dependence on imported medications (Veerappan et al., 2007).

Conclusions

From present study it is concluded that selected plant *Sonchus oleraceus* L. have wide range of phytoconstituents. The selected plant is antibacterial agent as results have showed that growth inhibition against gram positive and gram negative in all samples. Regarding these properties there is need for detailed research on *S.oleraceus* L. So it can be employed in pharmaceutical industries for the manufacturing of novel drugs for humans and animals.

Conflict of Interest: Authors declare no conflict of interest.

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