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# Phytochemical and Antimicrobial Activity of *Sonchus eruca*

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**The development of new antimicrobial agents against multidrug resistant pathogens for the treatment of skin infections is of increasing interest. Therefore, the methanol, ethyl acetate chloroform and water extracts from different parts of *Sonchus eruca* were evaluated for antimicrobial activity against the most frequent skin pathogens. It was found that most plant extracts studied had antibacterial and antifungal activities. The antibacterial activities with the highest zone of inhibition 19 and 18 mm were significantly produced by the leaves extracts of *Sonchus eruca* against *Klebsella*. All other extracts of root, stem and leaves also showed significant results. Phytochemical anaylsis of *Sonchus eruca* confirmed the presence of Flavonoids, Saponins, Antraquinone, Terpenoids, Tannins, Reducing Sugar and Cardiac glycosides. Antimicrobial activities may be due to the flavoniods.**

**Key words:** Antimicrobial activity, phytochemicals, *Sonchus eruca*.

The use of plants is in practices from centuries for medicinal and nutritional purposes. In different parts of the world many plants and their parts are utilized for the treatment of different diseases. Many plants in the world are being tested for antimicrobial activities and the results got from these scientific studies have aided in the validation of traditional uses of the plants[1]. There is a great contribution of medicinal plants in the human healthiness for the treatment of different diseases. Plants are the main source of anti-infective agents like quinine, emetine and berberine which remain highly effective instruments in the fight against microbial infections. Phytoremedies have also shown great promise in the treatment of intractable infectious diseases including opportunistic AIDS infections[2]. Infectious diseases and global antibiotic resistant pathogens are an increasing public health problem. The lack of development of new antimicrobial agents in the last decades, associated with their misuse, led to the emergence of multiresistant microorganisms[3]. Many efforts have been made to discover new antimicrobial compounds from various species of medicinal plants. Medicinal plants are heavily and worldwide used in folk medicine. Screening of such plants may result in the discovery of novel effective compounds against pathogenic microorganisms. The compounds that can either inhibit the growth of pathogens or kill them and have no or least toxicity to host cells are considered candidates for developing new antimicrobial drugs[4].

The world health organization (1985) estimates that, 80% of the people living in developing countries almost exclusively use traditional medicine for their primary health care needs. However, the effectiveness of the majority of the

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herbal remedies that are used today is yet to be validated. Limited knowledge, as well as lack of scientific studies on the practices of local herbalists has led to the neglect of potentially valuable drug containing plants[5].

## MATERIALS AND METHODS

### Plant Material

*Sonchus eruca* is a common plant and grows in different parts of Pakistan. It was collected in March- June in flowering season and was identified by the help of plant taxonomist.

### Antimicrobial activity

### Preparation of crude extract

100 g of each of the coarsely powdered plant material was taken and extracted with methanol. Then this crude of methanol is further fractionating into n-hexane, Chloroform, ethyl acetate and water. The extracts were filtered and sodium chloride solution was then added to the filtered extract to form precipitates. The precipitates were then separated, air dried and transferred to air tight amber glass container. The crude extract was dissolved in chloroform and water to make the final concentration, which was kept in refrigerator till use[6].

### Phytochemical analysis and Antimicrobial bioassy

Phytochemical analysis and antimicrobial activities assay were conducted as described by Hussain et al.[7]

## RESULTS AND DISCUSSION

The current study was initiated because of the increasing resistance to antibiotics of many skin pathogens including bacteria and fungi. Plant extracts and compounds are of new interest as antiseptics and antimicrobial agents in dermatology[4]. As a result, the phytochemical and antimicrobial activity of different parts *Sonchus eruca* was screened against the most common skin pathogens. Table 1 showed that chloroform extract of root, stem and leaves showed significant result again *E. coli*. Similarly ethyle acetate crude extract of root, stem and leaves showed significant result against *Staphylococcus*. While the root, stem and leaves fraction of water extract active agains *Klebsella*. This study gives more specific result. It showed that which fraction of which part of plant against which bacteria and fungus will be screened for specific anti-bacterial and anti-fungal agent.

**Table 1.** Antibacterial activities of *Sonchus eruca*

| Name of bacteria | $CH_3OH$[a] R + S + L | EtOAc[a] R + S + L | $CHCl_3$[a] R + S+ L | $H_2O$[a] R+ S + L |
|---|---|---|---|---|
| *E. coli* | 12 + N + 11 | 11 +11 +12 | 12+ N+10 | 10+12+ 15 |
| *Staphylococcus* | N + 16 + 13 | 9 + 7+13 | 11+ N+ 11 | 15 +11 + N |
| *Klebsella* | N + N + 18 | 13+13+ 19 | 11+ 13+15 | N+ 12 + 12 |
| *Salmonella* | 17+ 11 + N | N + 14+N | N+ 17+ N | 14+ N + 14 |

a = Zone of Inhibition in mm N= Nil, R=Root, S=Stem, L=Leaves

### Root extract

As can be seen from Table 1; the root extract of methanol showed highest zone of inhibition 17mm against *Salmonella* fallowed by water extract of root 15 mm against *Staphylococcus*. Root extract of methanol and water found completely inactive against *Klebsella*.

### Stem extract

Table 1 showed that stem extract of chloroform showed highest zone of inhibition 17 mm against *Salmonella* fallowed by methanol extract of root 16 mm against *Staphylococcus*. Stem extract of methanol and chloroform found completely inactive against *E. coli*

### Leaves extract

Leaves sample have high activities than the root and stem samples. Highest zone of inhibition showed by ethyl acetate extract 19 mm activity followed by methanol extract 18 mm against *Klebsella*. Leaves extract of methanol, chloroform and ethyl acetate found completely inactive against *Salmonella*

**Table 2.** Antifungal activity of tested fractions of *Sonchus eruca*

| Name of fungi | $CH_3OH$R+S+L | EtOAcR+S+L | $CHCl_3$R+ S+L | $H_2O$R+S+L |
|---|---|---|---|---|
| *Fumigates* | N+N+N | P+P+N | P+P+N | N+N+P |
| *Solani* | P+P+P | N+P+N | N+P+P | P+N+N |
| *Nigar* | N+N+P | N+P+ P | N+N+P | P+N+N |
| *Flavours* | P+N+P | P+ P+N | P+N+P | N+P+N |

R=Root, S=Stem, L=Leaves, P=Positive, N=Negative

**Root extract**

The root extracts of chloroform and ethyl acetate showed positive result against *Fumigates* and *Flavours* while the same crude fractions are inactive against *Solani* and *Nigar.*

**Stem extract**

Stem extract of methanol only active against *Solani* while inactive against Fumigates, Nigar and Flavours. Ethyl acetate fraction of stem extract found active against all four tested pathogen. Water extract only active against *Flavours.*

**Leaves Extract**

Leaves extract of methanol and chloroform gave positive result against Solani, Nigar and Flavours. Water extract only showed positive result against Fumigates while ethyl acetate extract only active against Nigar.

**Table 3.** Phytochemical screening of powder of *Sonchus eruca*

| S. No | Test | *S. xanthocarpium* |
|---|---|---|
| 1 | Flavonoids | Positive |
| 2 | Saponins | Positive |
| 3 | Antraquinone | Positive |
| 4 | Terpenoids | Positive |
| 5 | Tannins | Positive |
| 6 | Reducing Sugar | Positive |
| 7 | Cardiac glycosides | Positive |

From Table 3 it is clear that *Sonchus eruca* give positive result for Flavonoids, Saponins, Antraquinone, Terpenoids, Tannins, Reducing Sugar and Cardiac glycosides. Flavonoids are a group of phenolics that are found in varying amounts in foods and medicinal plants which have been shown to exert anti-allergic, anti-inflammatory[8], anti-microbial and, antihepatotoxic activities[9]. This plant species can be use as a source for isolation of different classes of natural product including Flavonoids, Saponins, Antraquinone, Terpenoids, Tannins, Reducing Sugar and Cardiac glycosides.

This is first such report to evaluated individually root, stem and leaves extracts of methanol, ethyacetate, chloroform and water extract of different parts of *Sonchus eruca.*

## CONCLUSION

Studies showed that the microbial activity of medicinal plant is due to presence of various secondary metabolites. Hence, these plants can be used to discover bioactive natural products that may serve as leads in the development of new pharmaceuticals research activities[10]

Plants are natural factories of secondary metabolites. These secondary metabolites may be responsible for antimicrobial activities. In future specific antimicrobial agent can be possible to isolate from this species.

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