

An evaluation of the Antibacterial activity of root extracts of *Chloris barbata* Sw. against *Staphylococcus aureus* 9886 and *Escherichia coli* 1673

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Abstract: *Chloris barbata* Sw. powdered root material was extracted using water and chloroform. Phytochemical screening of the crude extracts revealed the presence of carbohydrates, glycosides, proteins and amino acids. This presence of the bioactive constituents have been linked to the antibacterial activity of the plant material against *Staphylococcus aureus* 9886 (gm^{+ve}) and *Escherichia coli* 1673 (gm^{-ve}) using agar cup plate method. Minimum inhibitory concentration values ranged from 25-100 mg/ml. The plant can be used as a source of oral drugs to fight infections against susceptible bacteria.

Keywords: *Chloris barbata* root, antibacterial activity, *Staphylococcus aureus*, *Escherichia coli*

Introduction

This paper discusses about the antibacterial properties of *Chloris barbata* Sw against *Staphylococcus aureus* 9886 (gm^{+ve}) and *Escherichia coli* 1673 (gm^{-ve}) by using agar cup plate method. *Chloris barbata* belongs to the family of Poaceae. It is widely present as a weed in tropics & subtropics, Indian continent, China, S.E. Asia and Java.

Chloris barbata (SW.), commonly called as swollen finger grass is a tufted annual grass about 70cm high, internodes are longer at the top and shorter at base; leaves lanceolate, narrowly linear, acuminate; spikes 6cm long, floral glumes densely hair, awned, grains oblong. It is terrestrial, annual tufted erect or prostrate herb, rooting at nodes. Roots are fibrous in nature. Stems are flat, hollow and glabrous. Nodes and stipules are absent. Leaves are alternate spiral, sessile, linear, more than 2 cm long/wide, margin entire or undulate, apex acute, base clasping, parallel-veined. Leaf sheath is present, rounded in cross section. Fruits are nuts. Flowers are bisexual grouped together in a terminal digitate raceme, sessile, green or brown, petals not visible. Anthers are three in number. Frequently found along cultivated fields and in forest hilly areas^{1,2}. The whole plant is used in treating Rheumatism³. The juice from the plant is used in treating various skin disorders and possesses anti-diabetic, antibacterial properties⁴ traditionally *Chloris barbata* (SW.) has been used in treatment of many types of pain and inflammatory conditions.

Very few works have been carried out on aerial parts for antibacterial activity⁵, analgesic and anti-inflammatory activity⁶. No scientific report is available on the roots and so the present study has been carried out to investigate the antibacterial activity of aqueous extract and chloroform extract of

Chloris barbata against *Staphylococcus aureus* and *Escherichia coli*.

Materials and Methods

Collection of plant material:

The roots which were used for the extraction process were primarily collected from local areas of Guntur. Further these roots were subjected to air drying for about two weeks and were used for the extraction.

Preparation of the plant material:

The fresh plant was harvested, rinsed with tap water and air dried under shade for about 14 days and reduced to fine powder using blender. The powder was stored in an air tight bottle until needed for use.

Preparation of the extract:

20 gm of the powdered sample was soaked in 100 ml of the solvent contained in a 500 ml of sterile conical flask and covered with a cotton wool. It was then plugged and wrapped with aluminum foil and shaken vigorously. The mixture was left to stand overnight (24 hours). The mixture was then filtered using a clean muslin cloth and then whatmann no: 1 filter paper. The filtrate was then evaporated to dryness at 40°C. The percentage yield was calculated. For the preparation of dilutions of crude extracts for antibacterial activity assay, the extracts were reconstituted by dissolving in the distilled water and further diluted to obtain 100-25 mg/ml. the same procedure was repeated using chloroform as a solvent for extraction.

Microorganisms:

The selected microorganisms *Staphylococcus aureus* 9886 and *Escherichia coli* 1673 were obtained from the IMTECH, Chandigarh and were stored in a refrigerator for further process.

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Reference and Control:

The references were antibiotic in nature and tetracycline was used as the reference for all bacterial species. The Control experiment consists of a plate of solidifying agar onto which was inoculated pure solvent with microorganism mixed in a 1:1 portion.

Phytochemical screening of the plant material:

Phytochemical screening was carried out on the powdered plant material for the presence of different bioactive components such as carboxylic acids, glycosides, proteins and amino acids.

Determination of antibacterial activity⁷:

The antibacterial activity of the aqueous extract and chloroform extract of *Chloris barbata* was determined using agar cup plate method. Cups or wells of 8 mm diameter were punched in the agar medium. Aqueous solutions of different concentrations of the plant extract were dispensed in different wells and incubated at 37° C for 24 hours. The control wells were loaded with saline (negative control) and tetracycline (100µg/ml) for *Staphylococcus aureus* as positive control. The antibacterial activity was assessed by measuring the zone of inhibition. The relative antibacterial activity of the extract was calculated by comparing its zone of inhibition with the standard drugs.

Results and Discussions

Percentage yield of the powdered plant *Chloris barbata* extract obtained by using water is shown in Table 1. Out of the 20 g of the powdered plant material, the percentage yield obtained was 2.5%. Phytochemical screening of the crude extracts of *Chloris barbata* revealed the presence of some bioactive components as shown in table 2. It contains carboxylic acids, glycosides, proteins and amino acids. These compounds have potentially significant application against human pathogens, including those that cause enteric infections. The presence of glycosides is interesting, as significant quantities are used as antimalarials, analgesics and stimulants. Antibacterial activity of the crude extracts of *Chloris barbata* were evaluated by measuring the diameters of zone of growth inhibition on some members of enterobacteriaceae and the results are presented as shown in table 3. It indicates that the root extract of *Chloris barbata* showed antibacterial activity against both gram positive and gram negative bacteria. The MIC values obtained for the test bacteria are high ranging from 25-100 mg/ml. Although *Chloris barbata* was found to contain some bioactive compounds with pronounced antibacterial activities, further phytochemical and pharmacological studies will be needed to isolate the active constituents and evaluate the antibacterial

activities against a wide range of microbial pathogens.

Conclusion

Among the root extracts (Water and Chloroform), water extracts have significant antibacterial activity on *Staphylococcus aureus* and *Escherichia coli* and tetracycline was used as a standard drug. Chloroform extracts have less significant antibacterial activity on *Staphylococcus aureus* and *Escherichia coli*.

Table.1: Percentage yield of the crude extracts of *Chloris barbata*

Extraction solvent	Raw material powder (gm)	Extracted plant powder (gm)	Percentage yield
Distilled water (aqueous)	20	0.5	2.5%
Chloroform	20	0.25	1.25%

Table.2: Phytochemical constituents of *Chloris barbata* root

Plant constituents	Water extract	chloroform extract
Amino acids	+	+
Glycosides	+	+
Proteins	+	+
Carboxylic acids	+	+

Table.3: antibacterial activity of *Chloris barbata* root

Organism	Zone of inhibition of aqueous extract	Zone of inhibition of chloroform extract	Antibiotic	Zone of inhibition
<i>E. coli</i>	18 mm	08 mm	Tetracycline	22 mm
<i>Staphylococcus aureus</i>	11 mm	09 mm		

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