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Pharmacognostic Profile and Antibacterial Activity of Aerial Parts of *Chenopodiastrum Murale*

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Abstract

Nettleleaf goosefoot was observed on Chenopodium murale at Barapani, Meghalaya, India. C. murale is used as a leafy vegetable in the north-eastern hills region of India. This species is mainly regarded as a summer weed in the Mediterranean region. The antibacterial activity of crude petroleum ether, benzene, chloroform, acetone, ethanol and aqueous extracts of *Chenopodiastrum murale* aerial parts were tested against *Staphylococcus capitis, Staphylococcus mutans, Pseudomonas mirabilis* and *Bacillus fragillis.* The *in vitro* antibacterial activity was performed by agar disc diffusion method. The zone of inhibition was compared with the standard drug i.e. Penicillin. Petroleum ether, chloroform, acetone and ethanol extracts were effective against the entire four test microorganism used respectively when compared to standard drug penicillin. The minimum inhibitory concentration [MIC] for *S.capitis* was 10,750,10,10,10 and 1000 mg/ml; MIC for *S.mutans* was 10,125,10,10,10 and 10 mg/ml; MIC for *P.mirabilis* was 20, 10,10,10,20 and 10 mg/ml and MIC for *B.fragillis* was 10,10,10,20,10 and 20 mg/ml for petroleum ether, benzene, chloroform, acetone, ethanol and aqueous extracts respectively suggesting the antibacterial activity of *Chenopodiastrum murale*. Acetone extract was more effective followed by ethanol extract as antibacterial agents when compared to other extracts of aerial parts of *Chenopodiastrum murale*. Leaves and young shoots - raw or cooked as spinach. The raw leaves should only be eaten in small quantities, see the notes above on toxicity. Seed - cooked. It can be ground into a powder and mixed with wheat or other cereals and used in making bread etc.Work is under progress to reveal the chemical nature of the active constituents responsible for the antibacterial activity.

Keywords

Aerial parts, antibacterial activity, *Chenopodiastrum murale,* minimum inhibitory concentration, zone of inhibition.

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INTRODUCTION:

Nettleleaf goosefoot was observed on Chenopodium murale at Barapani, Meghalaya, India. C. murale is used as a leafy vegetable in the north-eastern hills region of India. This species is mainly regarded as a summer weed in the Mediterranean region. However, it has spread to different geographical areas in the world including sub-tropical, temperate and cool climate regions in Canada, North America and Europe. It is generally less frequent in cooler temperatures.

The leaves and seeds of all members of this genus are more or less edible. However, many of the species in this genus contain saponins, though usually in quantities too small to do any harm. Although toxic, saponins are poorly absorbed by the body and most pass straight through without any problem. They are also broken down to a large extent in the cooking process. Saponins are found in many foods, such as some beans. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish. The plants also contain some oxalic acid, which in large quantities can lock up some of the nutrients in the food. However, even considering this, they are very nutritious vegetables in reasonable quantities. Cooking the plants will reduce their content of oxalic acid. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition.

Chenopodium murale is an ANNUAL growing to 0.6 m (2ft). It is in flower from July to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

Leaves and young shoots - raw or cooked as spinach. The raw leaves should only be eaten in small quantities, see the notes above on toxicity. Seed - cooked. It can be ground into a powder and mixed with wheat or other cereals and used in making bread etc. The seed is small and fiddly; it should be soaked in water overnight and thoroughly rinsed before it is used in order to remove any saponins.

However, there is no report on antibacterial activity of this plant. In the light of the above information, the present investigation was under taken to evaluate the antibacterial potential of different extracts of aerial parts of *Chenopodiastrum murale* Linn.

MATERIALS AND METHODS:

Plant Material

Plant material used in the study consisted of aerial parts of *Chenopodiastrum murale* Linn. was collected from the local area of Meghalaya, and authenticated by Department of Botany, Govt Maharaja College, Chhatarpur (M.P.). A voucher specimen is preserved in the Department.

Preparation of plant extract:

The dried aerial parts were coarsely powdered and subjected to successive extraction by soxhlation. The extraction was done with different solvents in their increasing order of polarity such as petroleum ether, benzene, chloroform, acetone, ethanol and distilled water. Each time the marc was dried and later extracted with other solvents. All the extract were concentrated by rotary vacuum evaporator and evaporated to dryness. 5 mg of the extract was weighed and dissolved in 5ml of DMSO which was labeled as stock 1. From stock 1 further dilution were made so as to get 10, 20, 50, 125, 250, 750 and 1000 µg/ml concentrations by using DMSO as solvent.

Microorganisms used:

All the microbial cultures, used for antimicrobial screening were procured from Microbiology Department of V.N.S. Institute of Pharmacy, Bhopal. The bacterial culture were maintained on Muller Hinton agar slants which were stored at 4°C

Antibacterial activity:

Determination of minimum inhibitory concentration (MIC)

The extract were screened for their antibacterial activity *in vitro* by disc diffusion method [16] using S.*capitis, S. mutans, P. mirabilis* and *B.fragillis* as test organism. Agar cultures of the test microorganisms were prepared. Three to five similar colonies were selected and transferred to 5 ml broth with a loop and the broth cultures were incubated for 24 h at 37°C and suspension was checked to provide approximately 10^{10} colony forming units per ml. 0.1 ml of organism's suspension were spread evenly on the agar plates. For screening, sterile 3 mm diameter disc (Whatman filter paper No. 1) were impregnated with different concentration till saturation, dried and placed in inoculated plates of Muller Hinton agar medium. DMSO solvent was used as negative control. The plates were incubated at 37°C for 24 h. After incubation for 24 h, the results were recorded by measuring the zones of inhibition surrounding the disc and the lowest concentration of each extract which is showing inhibition of growth of bacteria was

determined as MIC. Penicillin (10 µg/ml) was used as standard for bacteria.

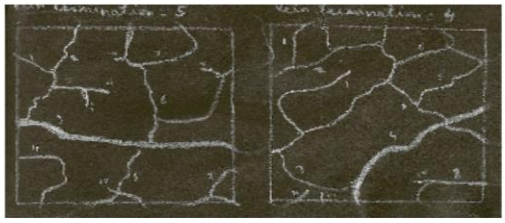
RESULTS AND DISCUSSION:

Microscopy of Leaf

Leaf Constant:

Sample Identity	Stomatal no.	Stomatal index	Vein islet no.	Vein termination no.	Palisade ratio
Leaves	200	9.35	200	125	9

Palisade ratio



Vein termination number

The antibacterial activity of *Chenopodiastrum murale* aerial part extracts was studied by employing disc diffusion method against *Staphylococcus capitis, Staphylococcus mutans, Pseudomonas mirabilis* and *Bacillus fragillis.* The results of minimum inhibitory concentration and zone of inhibition are given in Table 1 and Table 2.

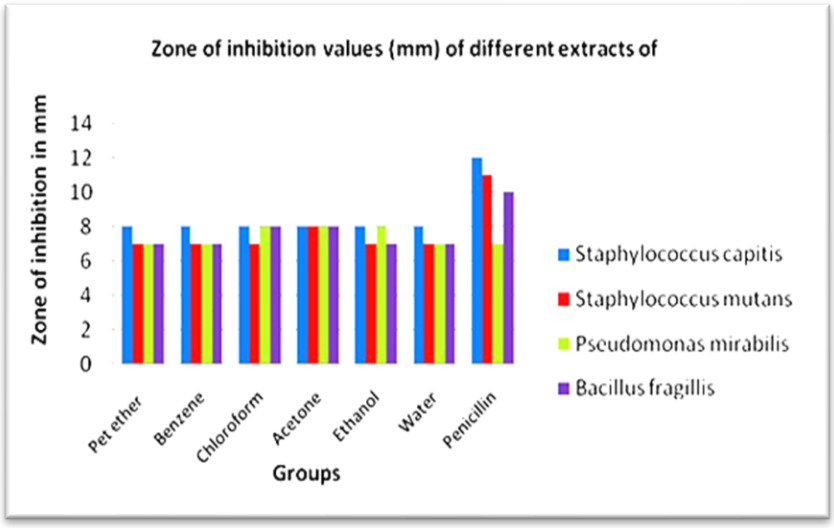
Table 1: MIC values of different extracts of aerial parts of *Chenopodiastrum murale*

Microorganism used	MIC with concentration of extract [mg/ml]					
	Petroleum ether	Benzene	Chloroform	Acetone	Ethanol	Water
Staphylococcus capitis	10	750	10	10	10	1000
Staphylococcus mutans	10	125	10	10	10	10
Pseudomonas mirabilis	20	10	10	10	20	10
Bacillus fragillis	10	10	10	20	10	20

Table 2: Zone of inhibition values (mm) of different extracts of *Chenopodiastrum murale*

Microorganism used	Zone of inhibition (mm) of extracts and standard						
	Petroleum ether	Benzene	Chloroform	Acetone	Ethanol	Water	Penicillin
Staphylococcus capitis	7	6	6	7	7	7	11
Staphylococcus mutans	7	5	8	8	7	8	12
Pseudomonas mirabilis	8	7	8	8	8	7	7
Bacillus fragillis	9	7	7	8	9	7	11

Fig 1: Zone of inhibition [mm] of different extracts of *Chenopodiastrum murale*



It is clear from the Table 1 and 2 and Fig 1, Petroleum ether, chloroform, acetone and ethanol extracts were effective against the entire four test microorganism used respectively when compared to standard drug penicillin. The minimum inhibitory concentration [MIC] for *S.capitis* was 10,750,10,10,10 and 1000 mg/ml; MIC for *S.mutans* was 10,125,10,10,10 and 10 mg/ml; MIC for *P.mirabilis* was 20, 10,10,10,20 and 10 mg/ml and MIC for *B.fragillis* was 10,10,10,20,10 and 20 mg/ml for petroleum ether, benzene, chloroform, acetone, ethanol and aqueous extracts respectively suggesting the antibacterial activity of *Chenopodiastrum murale*. Work is under progress to reveal the chemical nature of the active constituents responsible for the antibacterial activity.

CONCLUSION:

The above results suggest that acetone extract was more effective followed by ethanol extract as antibacterial agents when compared to other extracts of aerial parts of *Chenopodiastrum murale*.

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