



A REVIEW OF ALTERNANTHERA SESSILIS

Physiology

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ABSTRACT

Alternanthera sessilis, a plant commonly found in tropical and sub-tropical countries is commonly known as sessile joyweed, dwarf copperleaf. In Asian countries like India, this plant is used as vegetable also. Its leaves, flowers and young shoots are taken with food in the states of Tamilnadu, Andhra Pradesh and Karnataka. The plant because of its diuretic, cooling, laxative and tonic properties is used in preparation of ayurvedic medicines. It is also known to be used for dysuria and haemorrhoids. The plant is also found to have beneficial effect for the eyes and hair follicles.

KEYWORDS

Alternanthera sessilis, anti diabetic, anti microbial, ponnaganni and sessile joyweed

INTRODUCTION:

Alternanthera sessilis is a herb, growing upto 0.2 to 1 meter high with support of strong taproots. The leaves grow at opposite sides. It is shortly leafstalk or sessile and broadly subulate or spatulate to almost linear, 0.3 to 1 cm wide and 0.6 to 5 cm long. The inflorescences are sessile, dense, silvery-white clusters of compressed spikes in the leaf axils. The plant has attenuated base, crusty apex and glossy margins. Seeds are dark brown to black disc shaped, glossy and about 0.8 to 1 mm in diameter (1). *Alternanthera sessilis* bouillon is recommended for vomiting, bronchitis, nausea, wounds and diarrhoea. In combination with other plants, it is helpful in the treatment of asthma, hepatitis, bronchitis, tight chest and other lung defects. *A. Sessilis* roots are useful in relieving inflamed wounds and hypertension (11).

Propagation:

In India and south Asian countries, the plant is used as remedy for headache, severe pain, low sperm count, leucorrhoea, hepatitis, asthma and other lung diseases. In India and Bangladesh, *Alternanthera sessilis* is well known for its medicinal properties (2).

Botanical nomenclature: Domain:

LECA (Last Eukarya Common Ancestor): Eukarya: Tracheophytes: Magnoliophyta: Eudicots: Caryophyllales: Amaranth family: *Alternanthera* genus and *Alternanthera* species.

Regional Names:

Tamil: Ponnakanni, koduppai, citai; Malayalam: Ponnankannikkira, Meenamgani; Telugu: ponnagantikura; Kannada: Honagone; Marathi: kanchari; Bengali: Chanchi, Haicha, Schishak; Hindi: Gudrisag, Garundi; Manipuri: Phakchet; Sanskrit: Matsyaki, *Lonica*. French: Magloire, Chevrette; Portuguese: Bredo-D; Chinese: Lian Zi Cao, Bai Hua.

Chemical Composition:

Herb contains ester, hydrocarbon and sterols, such as stigmasterol, α & β spinasterol, α stigmastanol, campesterol, β -sitosterol and palmitates of sterol; it also contains 24-methylenecycloartanol and cycloecalenol. Saponins have been isolated from the leaves. Roots contain lupeol. Young shoots are rich in useful proteins and iron. It also contains 5-a-stigmasta-7-enol.

1. Antidiarrhoeal Action: Material & Methods:

2. During the months of may or June, the plant parts are freshly collected. Extraction and Preparation of the Extract: The plant parts are made to air dry for a duration of about one week. Then, it was further dried in oven at 40°C. The dried leaves of the plant were pulverized into fine powder. Distilled water was added to the powder and kept for 72 hours. For every 6 hours, the mixture was stirred uniformly by a sterile glass rod. After 72 hours, the extract

was filtered using filter paper and the filtrate obtained was concentrated using a vacuum pump and rota-vapour at 40°C. The obtained extract was stored in refrigerator. Animals: Albino Swiss mice were used for the study. The study was done by inducing diarrhoea using castor oil in the mice. Result And Conclusion: The results indicated antidiarrhoeal effect of aqueous extract because of its inhibitory effect on gastrointestinal secretions & peristalsis.

3. Antihyperglycemic Activity: Material & Methods:

Aerial parts (leaves and stems) of *A. sessilis* were collected. Preparation of methanolic extract: Aerial parts were cut into small pieces, air-dried in the shade and 100g of dried and powdered leaves and stems was extracted with methanol (w:v ratio of 1:6, final weight of the extract 8.03g). Chemicals and drugs: Glibenclamide, aspirin, and glucose Animals: Swiss albino mice (male). Antihyperglycemic activity: The fastened mice were grouped into six groups of 5 mice each. Group 1: Received vehicle Group 2: Received standard drug Group 3-6: Received extract (MEAAS) at doses of 50, 100, 200 and 400 mg per kg body weight. Following a period of one hour, all mice were orally administered 2 g glucose/kg of body weight. Blood samples were collected 120 minutes after the glucose administration through puncturing heart. Blood glucose levels were measured by glucose oxidase method. The percent lowering of blood glucose levels were calculated according to the formula described below. Percent lowering of blood glucose level = $(1 - W_e/W_c) \times 100$, Where W_e and W_c represent the blood glucose concentration in glibenclamide or MEAAS administered mice (Group 2-6), and control mice (Group 1) respectively. Antihyperglycemic activity evaluation results Administration of MEAAS at doses of 50, 100, 200 and 400 mg per kg body weight, the concentration of blood glucose in glucose-loaded mice was reduced significantly by 22.9, 30.7, 45.4 and 46.1% respectively. By comparison, a standard antihyperglycemic drug, glibenclamide, when administered to mice at a dose of 10 mg per kg body weight, reduced blood glucose level by 48.9%

4. Antimicrobial And Antifungal Effect: Material & Methods:

Fresh plant parts of *Alternanthera sessilis* were collected and washed thoroughly 4-5 times with running tap water and then finally with sterile water and dried in shade at room temperature for 20-25 days. The dried plant material was made into coarse powder and sieved, and then used for crude extraction. Solvents like water, ethanol, methanol, acetone, ethyl acetate, chloroform and petroleum ether were used for extraction. Extraction: 20 gm powder of each plant were soaked separately in 200ml water, ethanol, methanol acetone, ethyl acetate, chloroform, petroleum

ether in conical flask and kept in shaker for 24 hours. After the extract was filtered and collected into glass vials. The process was repeated for 3 times with same material but using fresh solvents. The extracts were collected and concentrated at 40°C under reduced pressure using rotary evaporator. The extract was stored at 4°C until further use. Test organisms: *Bacillus pumillus*, *Salmonella typhi*, *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aureginosa*, Fungal strains such as *Candida albicans*. Result And Discussion: The aqueous extracts *Alternanthera sessilis* showed good antibacterial activity against gram positive and gram-negative organisms. It suggests the usefulness of the plants against antimicrobial activity. So, it is anticipated that *Alternanthera* would be useful to treat diseases. This investigation may lead to the development of natural antimicrobial agents.

5. Nutritive Value: Material & Methods: Leaves of *Alternanthera sessilis* were harvested. The leaves were washed and dried to avoid destroying active compounds. Dried leaves were ground to homogenous powder using willow mill grinder and stored in air tight container. Sample was subjected to biochemical analysis. Biochemical Analysis: Biochemical analysis were carried out to find total Carbohydrate, Starch, Protein, Aminoacid, Vitamin B1 and Vitamin B2 according to the procedure of Association of Official Analytical Chemist (Sadasivam and Manickam, 1992). The cooking quality was analyzed for total Carbohydrate, Starch and Proteins. Results And Discussion: The biochemical composition of *Alternanthera sessilis* leaves based on cooking time interval of 0 min, 5min, 10min and 15min revealed that there was a gradual decrease in the composition of Carbohydrate and Starch. The composition of proteins remained approximately the same. Hence *Alternanthera sessilis* leaves can be recommended to be cooked in an average of 5–10 min.

6. Biosynthesized Silver Nanoparticles: Materials & Method: Animal: male Wistar albino rats (150 - 200 gm) Plant: *Alternanthera sessilis* Drugs: Silver nitrate, 95% Ethanol, Syndopa, Rotenone Preparation of silver nanoparticles: to 80 ml of silver nitrate solution, 20ml of plant extract was added. Change in colour to reddish brown confirms formation of silver nanoparticles. It is then made to centrifuge at 7000RPM for 10 min. The pellets obtained were dried and analysed for vitamin C and proteins in ASNPs. UV spectrum analysis: Silver ions reduction analysed by UV spectrum. Distilled water was used as blank. The UV analysis was done by double beam spectrophotometer, Shimadzu 1800, at resolution 1 nm from 250 to 450 nm. SEM analysis: FE-SEM (JEOL JSM 3600) was used to do the morphological characterization of the samples. A small amount of dried sample was coated on the carbon tape. It was again coated with platinum then the material was subjected to analysis. Results: UVvis Spectra Analysis: Extracts from whole plants under study showed rapid conversion of silver nitrate into silver nanoparticles indicated by colour change within few minutes of addition of extract in 3mM AgNO₃ solution, from pale yellow to red-brown. The spectrum showed a maximum absorption in range between 420 - 450 nm. Plant: *Alternanthera sessilis* Preparation of the Plant extracts: Fresh leaves of *A. sessilis* were separated, washed and shade dried for about 10 days. These dried leaves were ground to coarse powder using mechanical grinder. The dried leaves were subjected to sequential extraction using ethanol, ethyl acetate, hexane and water by Soxhlet extraction method using standard procedures. The grounded powder was dissolved using distilled water and filtered and used as an aqueous extract. The extracts obtained using solvents were concentrated using rotary vacuum evaporator and then dried. The collected extracts were stored and then taken up for further investigations. The resulted filtrate was used for both qualitative and quantitative phytochemical analysis. Qualitative Phytochemical Activity Screening Test for carbohydrates: The presence of carbohydrates was confirmed when 2ml of plant extract was treated with 1ml of Molisch's reagent and few drops of concentrated sulphuric acid resulted in the formation of purple or reddish color. Test for tannins: To 1ml of plant extract, 2ml of 5% ferric chloride was added. Formation of dark blue or greenish black indicates the presence of tannins. Test for saponins: 2ml of plant extract, 2ml of distilled water were added and shaken in a graduated cylinder for 15minutes lengthwise. It resulted in the formation of 1cm layer of foam indicated the presence of

saponins. Test for flavonoids: To 2ml of plant extract, 1ml of 2N sodium hydroxide was added. Presence of yellow color indicates the presence of flavonoids. Test for alkaloids: To 2ml of plant extract, 2ml of concentrated hydrochloric acid was added. Then few drops of Mayer's reagent were added. Presence of green color or white precipitate indicates the presence of alkaloids. Test for quinones: To 1ml of extract, 1ml of concentrated sulphuric acid was added. Formation of red color indicates presence of quinones. Test for glycosides: To 2ml of plant extract, 3ml of chloroform and 10% ammonia solution was added. Formation of pink color indicates presence of glycosides. Test for Cardiac Glycosides: To 0.5 ml of the extract, 2ml of glacial acetic acid and few drops of ferric chloride were added. This was under layered with 1ml of Conc. Sulphuric acid. Formation of brown ring at the interface indicates the presence of cardiac glycosides. Test for terpenoids: 0.5ml of the extract was treated with 2ml of Chloroform and conc. Sulphuric acid. Formation of red brown colour at the interface indicates the presence of terpenoids. Test for phenols: 2ml of distilled water followed by few drops of 10% ferric chloride was added to 1ml of the extract. Formation of blue or green color indicates presence of phenols. Steroids and phytosteroids: To 1ml of plant extract equal volume of chloroform is added and subjected with few drops of concentrated sulphuric acid appearance of brown ring indicates the presence of steroids and appearance of bluish brown ring indicates the presence of phytosteroids. Anthraquinones: To 1ml of plant extract few drops of 10% ammonia solution was added, appearance pink color precipitate indicates the presence of anthraquinones. Test for Coumarins: 1ml of 10% Sodium hydroxide was added to 1ml of the extract. Formation of yellow colour indicates the presence of coumarins. Ninhydrin Test: To 2ml of the plant extract few drops of 0.2% Ninhydrin reagent was added & heated for 5 minutes. Formation of blue colour indicates the presence of aminoacids. Test for Phlobatannins: Few drops of 2% Hydrochloric acid was added to 1ml of the extract. Appearance of red colour precipitate indicates the presence of phlobatannins. Conclusion: *A. sessilis* contains bioactive components especially in ethanolic extract of the leaves. Different phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases. For example, alkaloids protect against chronic diseases. Saponins protect against hypercholesterolemia and antibiotic properties. Steroids and triterpenoids show the analgesic properties

RESULT:

The plant *A. sessilis* can be used in preparation of many medications because of its renowned beneficial effects on different systems of the human body. Depending on the condition, the shoot, leaves, root or the whole plant can be used in preparation of different medications. This confirms the antidiarrheal, antihyperglycemic, antimicrobial, antifungal and nutritive actions of the plant (9).

DISCUSSION:

In the ethanolic extract of *A. sessilis* leaves, bioactive components are present. The phytochemicals obtained from the plant are beneficial in management of different chronic diseases. Such as saponins found to be useful in hypercholesterolemia and antibiotic effect; alkaloids beneficial in chronic diseases; Steroids and triterpenoids have analgesic effect (8). It can be further concluded that the plant *A. sessilis* is beneficial due its medical effects.

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