ANTIMICROBIAL ACTIVITY AND PRELIMINARY PHYTOCHEMICAL STUDIES OFTHE HERBAL PLANT *Solanum xanthocarpum.L*

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Abstract :

In the last few years plants have been used as antimicrobial agents because of their antimicrobial traits. This property is due to the bioactive compounds synthesized during secondary metabolism in plants. The use of plant interacts with known antimicrobial properties can be of great significance in therapeutic usage. It is at this critical juncture, the philosophy of traditional has made a comeback. Bio active substances in plants are produced as secondary metabolites which may not only development stage specific but also organ and tissue specific. Hence it is essential to screen the different parts of the medicinal plant viz., leaves, stem, fruits, flowers and root for their antimicrobial activity. The Western Ghats are rich in ethno botanical plants, which have pharmacological activity. Among the herbal plants our aim of the study is to screen the plant, S. xanthocarpum due to their undeniable importance in folklore medicine. All parts of the plant are used as medicine for asthma, chronic febrile illness and tuberculosis. A scientific study on its antimicrobial potential is not been reported much. Hence the present investigation is aimed to study the antimicrobial properties of the herbal plant S.xanthocarpum and a preliminary investigation was also made on its phytochemical properties. The sample fruits and leaves were collected from the same locality. The sample were extracted separately using different solvents such as chloroform, ethanol, methanol, chloroform: methanol (2: IV/V) methanol: chloroform (3: IV/V) and their antimicrobial activity was evaluated against some selected infectious microorganisms by adopting disc diffusion method. Both extracts obtained from fruits and leaves of S.xanthocarpum were tested for antimicrobial activity. Antimicrobial activity of extracts of fresh fruits and leaves showed higher inhibitory activity against microorganisms. The extracts of fresh leaves with chloroform showed the maximum activity against B.sphaericus, K. pneumonia, Enterobacter aerogens and P.aeroginosa. The extracts of fresh fruits using chloroform revealed the best activity against P.aeruginosa, C.freundei. The extracts of fresh leaves of S.xanthocarpum using chloroform as solvent revealed the presence of phenols, proteins and free aminoacids, resins, xanthoproteins, sugars and traces of alkaloids. This may be the reason for its significant antimicrobial action. The chloroform extracts of fresh fruits revealed the presence of alkaloids, coumarins, phenols, proteins and free amino acids, resins, steroids, phytosterols, triterpenoidal sapogenins, tannins, xanthoproteins and sugar. The results of the present study provide a scientific validation for the popular use of the herbal plant, S.xanthocarpum and justify its use as a folklore medicine which is easily available, cost effective and has no harm on the viability of human cells. It is also possible that better therapy for many microbial diseases can be found in the leaves and fruits of the medicinal plant S.xanthocarpum.

Keywords: S.xanthocarpum, antimicrobial activity, phytochemical studies, disc diffusion method.

I. INTRODUCTION

The green plants are store houses of many chemical compounds. The drugs from aromatic plants must be a trusted chemical and should have pharmacological and clinical scrutiny. Invariably photochemistry deals with the variety of organic substances that are elaborated and accumulated by the plant and their chemical structure, bio-synthesis, turn over, metabolism, natural distribution and their biological function. In recent years the popularity of complementary medicine has increased. The present investigation aim is to focus the light on the chemical constituents of leaves and fruits of a valuable medicinal plant S.xanthocarpum. All parts of the plant is used exclusively in the folklore medicinal preparation. Historically all medicinal preparations were derived from plants, whether in the simple form of raw materials or in the refined form of crude extracts, mixtures, etc. Today most of the allopathy drugs have side effects but ayurvedic drugs have no side effects. Therefore most of the medicinal plants raw materials are used for the development of new drugs. The medicinal plants are easily available in Asian countries. One of which is S.xanthocarpum. It generally grows in March-April and often grows in waste places and road sides. S.xanthocarpum is an annual herbaceous plant, comprising 90 genera and 2000-3000 sp. It is commonly known as yellow berried shade is a prickly diffuse bright green perennial herb, woody at the base, 2-3m height, stems zig-zag, prickles compressed, straight yellow shiny leaves sinuate or sub pinnalified hairy on both sides, petide prickly, small flowers, corolla is purple and hairy outside. The fruits are glabrous, globular berries, green and white strips when young but yellow when mature. Fruits are surrounded by enlarged calyx.

II. MATERIALS AND METHODS:

Plant material:

The fresh whole plants of S.xanthocarpum were collected from Courtallam, in Western ghats, Tirunelveli and authenticated from the reference from literature. The fresh leaves and fresh fruits were used for the present investigation.

Preparation of extract:

The parts of the plant S.xanthocarpum such as leaves and fruits were collected and subsequently washed to remove adhering, dust particles. The leaves and fruits were cut into small pieces, separately and used to extract the antimicrobial compounds. About 40 grams of fresh leaves, 92 grams of fresh fruits were taken separately washed and dried using a filter paper. Leaves and fruits were cut into small pieces separately and placed in soxhlet extraction for the extraction of bioactive principles. In the present study for soxhlet extraction the solvents such as chloroform and chloroform: methanols were used for the extraction of antimicrobial compounds. The samples were flushed for 2 times with respective organic solvents. The extraction was allowed to run for 24 hours and the collected extracts were stored at 4% c till usage.

Microorganisms used:

Bacterial strain:

Ten Bacterial strains were employed in the present study to investigate the antibacterial properties of the herbal plant, S.xanthocarpum. The gram negative organisms such as E.coli, K. pneumonia, Enterobacter aerogens and P.aeroginosa. The gram positive organisms such as B.sphaericus, B.cereus, Stertococcus mutans were used to study the antibacterial property of herbal plant.

Fungal strains:

The pathogenic funged strain, candida albicans was employed in the present study.

Maintenance of cultures:

Bacterial strains were streaked on nutrient agar and fungal strains were streaked on potato dextrose agar plates to isolate and obtain the pure culture.

Preparation of herbal antibiotic discs:

Sterile filter paper discs of 6mm diameter were used in the present study. In each sterile disc 200 ml of the plant extract were incorporated using a 10ml pipette and the discs were allowed for air drying.

Assay of antimicrobial activity:

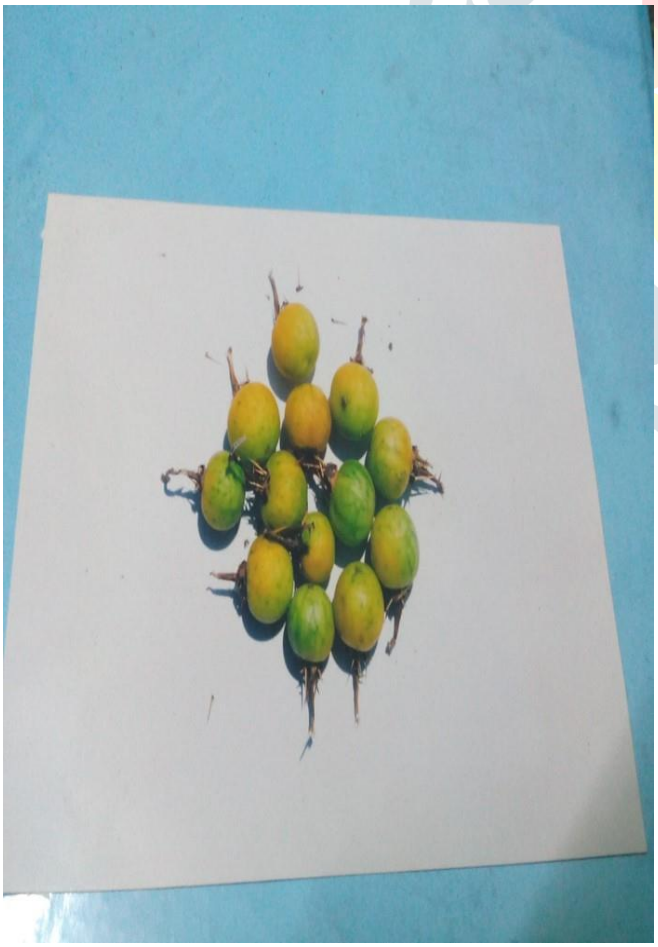
The antimicrobial activity was assessed using the disc diffusion assay.10 ml of sterile nutrient broth were aseptically inoculated wilt test cultures and incubated at 37±0.5°*c* for I8 hours. Using a sterile forceps, sterile disc leaded with plant extracts were placed on the surfaces of nutrient agar plates swabbed with test bacterial strains. Controls were also maintained by incorporating the respective solvents only, on sterile discs. Then the plates were incubated at 37±0.5°*c* for 12-14 hours. The zone of inhibition was observed and recorded in terms of diameters of zone as millimeters. Antifungal assay was conducted on candida albicans, MTCC 183. Fungal culture were maintained on SDA agar at 30c.

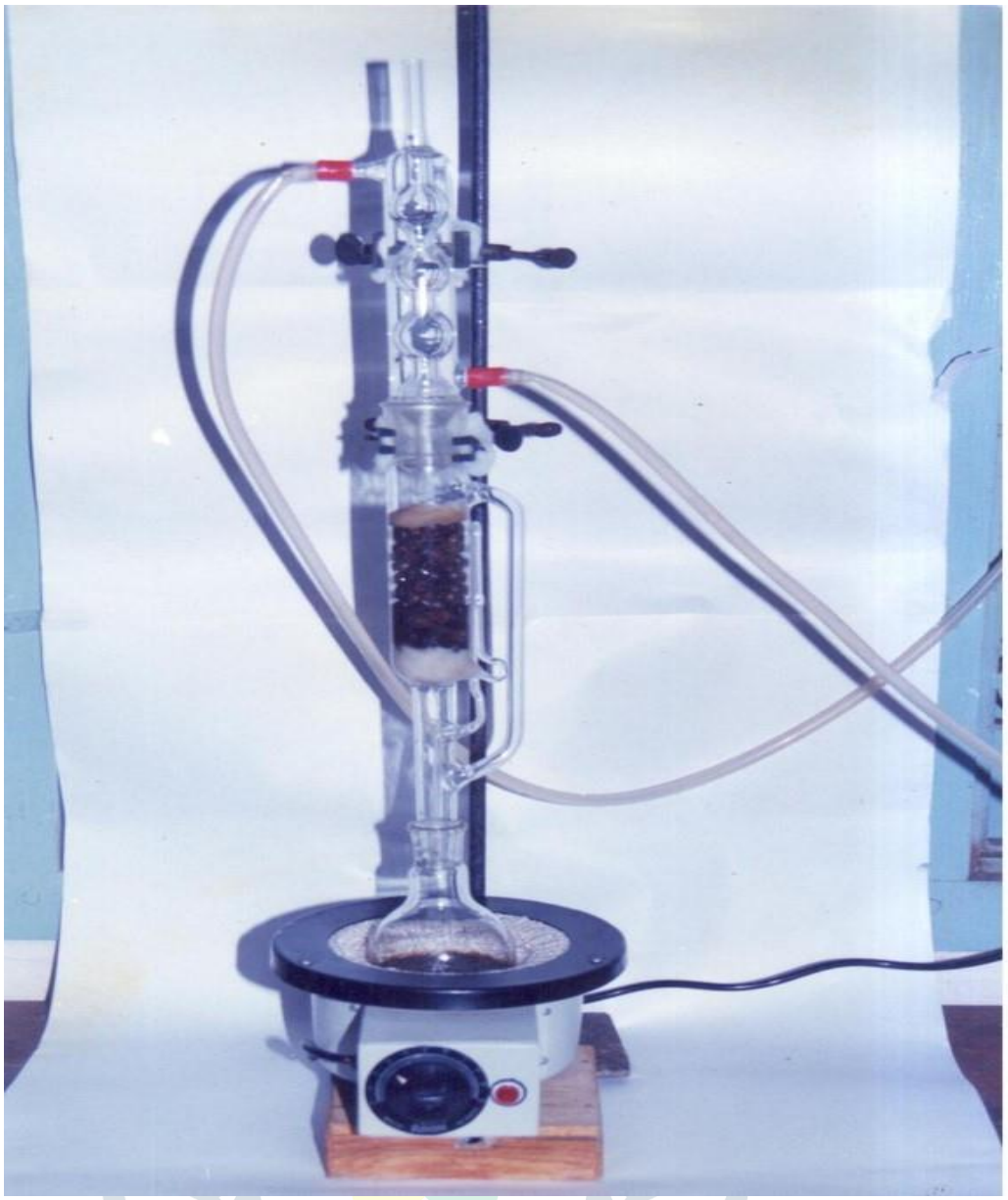
Preliminary phtochemical analysis:

The extracts of S.xanthocarpum using different solvents were screened for the qualitative identity of different classes of natured compounds, using the methodology of sofowara and kepm. The major pharmaceutically valuable phyto chemical compounds investigated in the present study are:

1. Alkaloids
2. Carboxylic acids
3. Coumerins
4. Flavanoids
5. Phenols
6. Proteins and free amino acids
7. Quinones
8. Resins
9. Tannins
10. Sterols

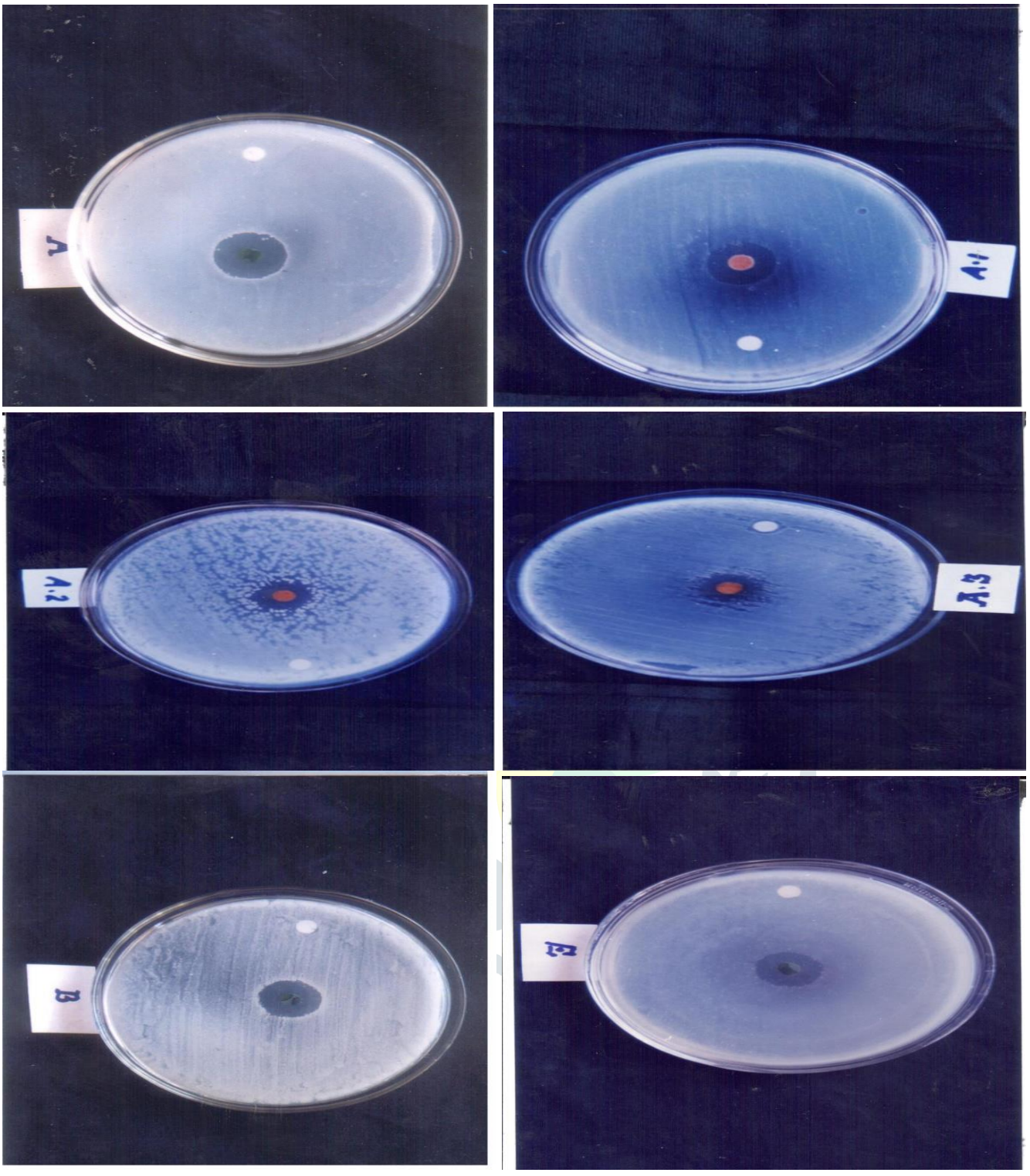
Solanum xanthocarpum.L





SOXHLET EXTRACTOR

Extracts of fresh leaves and fruits with chloroform showing the zone of inhibition



A- *Salmonalla typhi*
A1- *Bacillus sphaericus*
A2- *Candida albicans*
A3- *Klebsilla pneumoniae*
E- *Enterobacter aerogens*

III. RESULTS AND DISCUSSION:

The antimicrobial activity of both fresh leaves and fruits of S.xanthocarpum using different organic solvents were investigated by adopting disc diffusion method. The chloroform extract showed the maximum inhibitory activity against E. aerogens and minimum inhibitory activity against Bacillus sphaericus whereas Citrobacter freundii, Proteus sp., Klebsiella pneumonia and Bacillus cereus showed only trace activity. The soxhlet extraction of the fresh leaves of S.xanthocarpum was carried out using chloroform and chloroform: methanol combination. These solvents were selected based on the better extraction activity in the cold extraction. The chloroform extract expressed the zonation against E.aerogens and lowest activity against A.hydrophila whereas C.freundii, Micrococcus sp. and C.albicans showed trace inhibitory activity. The antimicrobial activity of soxhlet chloroform extract of fresh fruits, the higher inhibitory activity was recorded against C.freundii and P.aeroginosa and lowest activity against was observed against S.typhi and K.pneumoniae. The chloroform and chloroform, methonal solvent extracts of both fresh leaves and fruits exhibit significant role in anti candidal activity. This provides some scientific ratiionate for the use of compound obtained in this extract as an oral washin the treatment of candidal oral thrush. The broad Spectrum of action of chloroform and methonal are may be due to their better extracting Capacity Which are ultimately based on their polarity The soxhlet extracts of fresh leaves of S.xanthocarpum .L using chloroform as solvent revealed the presence of phenols, proteins and free aminoacids, resins, xanthoproteins, Sugars and traces of alkaloids. Maiti (1868) had reported earlier that the S. trilobatum L. Containing traces of alkaloids（0.36%). This may be the reasons for its significant antimicrobial action.

IV. CONCLUSION:

From this preliminary investigation it has been concluded that the herb, S.Xanthocarpum is having significant antimicrobial, the constituent present in the herb might be responsible for their activity. Preliminary phytochemical Screening of S.xanthocarpum revealed the presence of various bioactive principles of the extracts of fresh leaves, fresh fruits and dead fruits. These compounds should be isolated and elucidate their structure using advanced methods like Mass Spectroscopy, NMR and GCMS which aid in the identification of antimicrobial compounds and their use to threat human diseases of microbial origin.

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