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Research Article

ANTHELMINTIC AND ANTIMICROBIAL ACTIVITY OF PETROLEUM ETHER EXTRACT OF *YUCCA GLORIOSA L.* WHOLE PLANT

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ABSTRACT

The objective of the present investigation was to determine the anthelmintic and antimicrobial activity of Petroleum Ether Extract of *Yucca gloriosa L.* whole plant. Anthelmintic activity of this extract was evaluated on Indian adult earthworms, *Pheretima posthuma,* and exhibited a dose dependent inhibition of spontaneous motility (paralysis), and evoked responses to pin-prick, and the effects were comparable with that of piperazine citrate. The extract were also assayed for antimicrobial activity against various Gram positive organisms such as *Staphylococcus epidermidis, Micrococcus luteus, Bacillus subtilis,* and Gram negative organisms such as *Escherichia coli, Pseudomonas vulgaris, Salmonella typhi,* and fungal strains *Aspergillus niger, and Candida albicans*. Antimicrobial activity was conducted by the agar well diffusion method. The extract showed varies levels of antimicrobial activity on different test microorganisms. Future studies are in process to isolate the active principles responsible for the activity.

Keywords: Petroleum Ether Extract, *Yucca gloriosa L.* whole plant, Anti-microbial activity, Anthelmintic activity.

INTRODUCTION

The use of medicinal plants as a source for relief from illness can be traced back over five millennia to written documents of the early civilization in China, India and the Near east, but it is doubtless an art as old as mankind. Neanderthals living 60,000 years ago in present day Iraq used plants such as hollyback, these plants are still widely used in ethnomedicine around the world [1,2]. The potential of higher plants as source for new is drugs are still largely unexplored. Among the estimated 250,000-500,000 plant species, only a small percentage has been investigated phytochemically and the fraction submitted to biological or pharmacological screening is even smaller. Thus, any phytochemical investigation of a given plant will reveal only a very narrow spectrum of its in constituents. Historically pharmacological screening of compounds of natural or synthetic origin has been the source of innumerable therapeutic agents. Random screening as tool in discovering new biologically active molecules has been most productive in the area of antibiotics [3,4]. Even now, contrary to common belief, drugs from higher plants continue to occupy an important niche in modern medicine. On a global basis, atleast 130 drugs, all single chemical entities extracted from higher plants, or modified further synthetically, are currently in use, though some of them are now being made synthetically for economic reasons [5].

Medicinal plants represent a rich source of antimicrobial agents. Plants are used medicinally in different countries and are a source of many potent and powerful drugs. A wide range of medicinal plant parts is used for extract as raw drugs and they possess varied medicinal properties. The different parts used include root, stem, flower, fruit, twigs exudates and modified plant organs. While some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local used, many other raw drugs are collected in larger quantities and traded in the market as the raw material for many herbal industries. Although hundreds of plant species have been tested for antimicrobial properties, the vast majority of have not been adequately evaluated [6].

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Yucca gloriosa L. commonly known as Spanish Dagger and Family- Agavaceae. It is a stermsless or rising of stature of small trees and trunk short. This palnt leaves are 2-3 feet long, 2 in wide, long pointed, often tooth margin, mostly in rosettes at surface of ground or ends of trunk. Flowers has many cup or saucer shaped, hanging, greenish white to reddish, fragrant, born mostly in erect panicles that usually overtop the leaves. The whole plant of *Yucca gloriosa L.* is used for wound healing, infection, ulcer, asthma and bronchitis [7]. From the source of literature documentation and relevant traditional approaches on plant drugs, the present investigation was carried out to investigate the anthelmintic and antimicrobial activity of Petroleum Ether Extract of *Yucca gloriosa L.* whole plant (PYG) is being reported here.

MATERIALS AND METHODS

Plant material

The whole plant of *Yucca gloriosa L.*was collected from Tirumala hills, Tirupati, Andhra Pradesh. India. It was identified and authenticated by Prof. Madhava Chetty, K., Taxonomist, S.V. University, Tirupati, Andhra Pradesh, India. A voucher specimen has been kept in our laboratory for future reference.

Preparation of plant extract

The collected whole plant was dried at room temperature, pulverized by a mechanical grinder, sieved through 40mesh. About 100g of powdered materials were extracted with petroleum ether (60°-80°C) using soxhlet apparatus. The extraction was carried out until the extractive becomes colourless. The extracts is then concentrated and dried under reduced pressure. The solvent free semisolid mass thus obtained is dissolved in tween 80 and used for the experiment. The percentage yield of prepared extract was around 10.5%w/w.

Test microorganism

The microorganisms used for the antimicrobial activity evaluation were obtained from Sree Vidyanikethan College of Pharmacy, Tirupati. They were *Staphylococcus epidermidis* SMC 65, *Micrococcus luteus* MLM 541, *Bacillus subtilis* BSCC 87, *Escherichia coli* ECM 453, *Pseudomonas vulgaris* PVS 01, *Salmonella typhi* TSP 501, *Candida albicans* CAS 22 and *Aspergillus niger* ANG 432.

Antimicrobial activity

The agar diffusion method was used for the antimicrobial activity evaluations [8]. Wells of 8 mm diameter were punched into the Mueller-Hinton Agar (MHA, Merck), having the test microorganism and filled with 100 mg/ml of petroleum ether extract. The plates were incubated for 18 h at 37 ºC. Antimicrobial activity was evaluated by measuring the inhibition zone (including 8 mm diameter wells) against the test microorganisms. Standard antibiotic discs Ciprofloxacin (25 mg) and Griseofulvin (25 mg) was used as a reference.

Anthelmintic activity

The anthelmintic activity was assessed using adult indian earthworms, *Pheretima posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human being [9]. The method of Dash et al. [10] was followed for anthelmintic screening. Groups are divided into seven, each group consisting of six earthworms of approximately equal size. Each group was treated with one of the following: vehicle (1% gum acacia in normal saline), piperazine citrate (10, 20, 50 mg/ml) and petroleum ether extract of *Yucca gloriosa L.* (10, 20, 50 mg/ml) in normal saline containing 1% gum acacia. Observation was made for the time taken to paralysis and/or death of individual worms up to four hours of test period. Paralysis was said to occur when the worms did not revive even in normal saline. Death was concluded when the worms lost their motility followed with fading away of their body colour.

RESULTS AND DISCUSSION

In the search for compounds with anthelmintic activity, a number of substances have been screened using different species of worms, for example, earthworms, *Ascaris, Nippostrongylus* and *heterakis*. Of all these species, earthworms have been widely for the initial evaluation of anthelmintic compounds in vitro because they resemble intestinal worms in their reaction to anthelmintics and are easily available. It has been demonstrated that all anthelmintics are toxic to earthworms and a substance toxic to earthworms is worthy for investigation as an anthelmintic [11]. In this study we have evaluated the effect petroleum ether extract of *Yucca gloriosa L.* on earthworms. The results obtained are summarized in Table 1. It has been noted that petroleum ether extract showed comparable activity with that of standard piperazine citrate, a drug now widely used as anthelmintic, and in which the activity increased with concentration.

Furthermore the antimicrobial activity of petroleum ether extract of *Yucca gloriosa L.* was examined and found to exhibit good antibacterial activity against most of the Gram positive and Gram negative organisms which has been depicted in the Table 2. Among the test organisms the extract showed good antimicrobial activity against *Staphylococcus epidermis*, *Micrococcus luteus* and *Pseudomonas vulgaris*, and moderate activity against *Escherichia coli* and *Salmonella typhi*, and no activity against *Bacillus substilis*. The extract showed good antifungal activity against *Candida albicans* and no activity against *Aspergillus niger*. The result of the antimicrobial activity expressed in terms of diameter of zone of inhibition in millimeter. The performance of *Yucca gloriosa L.* extract against sensitive bacteria isolates did not show difference when compared with established commercial antibiotics prepared with griseofulvin and ciprofloxacin (Table 2).

Table 1. Anthelmintic activity of petroleum ether extract of *Yucca gloriosa L.*

Treatment	Time taken for paralysis (min)	Time taken for death (min)
Vehicle	-	-
Petroleum ether extract	83.24 ± 1.24	211.15 ± 2.62
20 mg/ml	44.16 ± 1.21	174.19 ± 1.18
50mg/ml	18.32 ± 1.14	55.12 ± 1.16
Piperazine citrate 10 mg/ml	95.21± 1.41	-
20 mg/ml	67.29 ± 1.15	-
50mg/ml	30.72 ± 0.54	-

Values represent the mean ± SD from six observations

Table 2. Antimicrobial activity of petroleum ether extract of *Yucca gloriosa L.*

Organisms	Mean zone of inhibition (mm)			
	Petroleum extract	Control	Ciprofloxacin (25 µg)	Griseofulvin (25 µg)
Staphylococcus epidermidis	25	-	28	NT
Micrococcus luteus	21	-	22	NT
Bacillus subtilis	-	-	25	NT
Escherichia coli	13	-	27	NT
Pseudomonas vulgaris	27	-	27	NT
Salmonella typhi	16	-	25	NT
Candida albicans	14	-	NT	14
Aspergillus niger	-	-	NT	11

NT – not tested.

CONCLUSION

These results suggests the need for further studies on this extract to identify, isolate, characterize and elucidate the structure of the active ingredient (s) using some spectroscopic techniques such as infrared spectrometry, nuclear magnetic resonance spectroscopy and mass spectrometry.

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