Phytochemistry And Antimicrobial Screening Of Stem Bark Of Murraya Koenigii(Linn) Spreng

S Zachariah, P Muthumani, K Ramaseshu

INTRODUCTION

Carbazole [1] alkaloids represent a new and interesting variant in the number of existing indole alkaloids which in the past have yielded several important drugs. A rich and rewarding source of carbazole alkaloids has been the Indian curry leaf plant Murraya koenigii (Spreng) Rutaceae. All plant parts of this plant including root, stem, leaves and fruits yielded carbazole alkaloids. Although search has been for the presence of various phytochemical constituents and pharmacological properties of the plant Murraya koenigii Spreng, it was decided to work on the stem of Murraya koenigii Spreng, which is widely used in indigenous medicine. The coarse powder on extraction with petroleum ether, chloroform and acetone showed the presence of alkaloids and coumarins and investigated for antibacterial and antifungal activity.

Murraya koenigii is an aromatic more or less deciduous shrub or a small tree up to 6m in height and 15-40 cm in diameter found throughout India up to an altitude of 1,500m commonly in forests often as gregarious under-growths. The Plant Murraya Koenigii belongs to family Rutaceae, commonly called “Curry leaf plant” in English and locally known as “Karivepu”. It is cultivated for its aromatic leaves. The plant used as Tonic, stomachic and carminative. Fresh juice of the root is taken to relieve pain associated with kidney. Leaves are used internally in dysentery and diarrhoea. The aqueous extracts of leaves, when administered parenterally to female guinea pigs, not only raised the phagocytic index but also mobilized a greater number of leucocytes to take part in phagocytosis.

PHYTOCHEMISTRY

The aqueous extract of M.koenigii leaves showed hypoglycaemic action in normal and alloxan diabetic dogs.(Narayana and Shastri,1975) The essential oil from M.koenigii leaves showed antibacterial effect against B.substillus, Staph. aureus, C.pyogenes,M.tuberculosis(Bhakuni et al.,1969) but found to be inactive. The pure oil was active against the first three organisms even at a dilution of 1:500 (Goutam and Purohit 1974).

Khosa ( 7-methoxy-8 (1,2-dihydroxy-3-methyl-3-butenyl) coumarin and 7-methoxy-8-formyl coumarin obtained from the leaves of M.paniculata exhibited antibacterial activity against E.coli and B.subtilis and antifungal activity against Aspergillus flavus, Pallicularia sasaki, Fusarium vasinfectum and Microsporum gypsum l-methoxy carbazolequinones for their potential cytotoxicity against MOLT-4 leukaemic and HOP-18 non small cell lung cancer cell lines.

The cytotoxicity of pyranocarbazole was found to be very active against leukaemia and colon cancer cell lines. The
petrol extract of leaves led to the isolation of 3, 5, 6, 8, 3’, 4’, 5’-heptamethoxy flavone and murrayatin together with auraptenol and meranzine hydrate. A new coumarin murrayone was isolated from the leaves of M.exotica. An optically active mahanimbine was isolated from the extract by Roy and Chakraborty et al.,1974., curryanin by Dutta(Dutta,N.L,Quasim.C,Wadia,M.S,Indian Journal of Chemistry,7,1969,307 et al., in 1969). A new coumarin murrayone was isolated from the leaves of M.exotica. An optically active mahanimbine was isolated from the extract by Roy and Chakraborty et al.,1974., curryanin by Dutta et al.

MATERIALS AND METHODS

PLANT MATERIAL

METHODOLOGY

1. Preliminary screening of crude extracts obtained after solvent extraction and partial purification by thin layer chromatography and chemical test.
2. Isolation and purification of selective phytoconstituents
3. Characterization of the purified compound
4. To study selective antibacterial and antifungal activity of the active constituents and crude extracts.

The plant Murraya koenigii were collected from Madurai district, Tamil Nadu, India in March 2003 and authenticated by Dr.D. Stephen, and a voucher specimen has been retained in our laboratory for further reference.

PREPARATION OF EXTRACT

The stem bark of Murraya koenigii (Linn.) Spreng were collected in the month of July and shade dried stem bark of Murraya koenigii (Linn.) Spreng. The stem bark of Murraya koenigii were collected in the month of July and dried in the shade. Then the shade dried stem barks were powdered to get a coarse powder mechanically.

EXTRACTION PROCEDURE

Dried coarse powder of the stem bark (1kg) were placed into the extractor of a Soxhlet apparatus and subjected to extraction separately by hot percolation method. The extraction was carried out by using solvents of increasing polarity starting from petroleum ether (60-70), chloroform and acetone. The extraction was carried out with 2 litres of each solvent for a period of 72 hours. At the end of the extraction the respective solvents were concentrated by evaporation. These crude extracts were redissolved in respective solvents and the following experiments were carried out to establish the presence of various constituents like alkaloids, sterols, coumarins, glycosides etc. The active constituents were isolated from the crude extracts of petroleum ether, chloroform and acetone. These fractions were further screened for antibacterial and antifungal activities.

PHARMACOLOGICAL SCREENING

ANTIMICROBIAL ACTIVITY

The antibacterial and antifungal activity of the various isolated compounds were studied in the following manner.

Potency of various extracts were tested against bacterial species using filter paper disc method. The plates were prepared with amikacin assay medium. Amikacin (5μg) was used as a standard. The activity of each compounds were compared with the antibacterial activity of amikacin.

The filter paper disc were soaked in the different preparation and then they were dried. These dried disc were placed on the swabbed agar already swabbed with test organisms. The plates were kept in the refrigerator for one hour to arrest the growth of the test organisms and to make the diffusion of the compounds. These place were incubated at 37 °C for 24 hours. The zones of inhibitions were observed.

Boiled the soild contents in 1000 ml of distilled water in a conical flask. The pH of the medium should be adjusted to 7.4 sterilized by autoclaving at 121 °C for 15 min. Cooled to 50-55 °C and dispensed aseptically in the petridishes.

The sterilized nutrient agar media was treated on a water bath to melt the media. When the media was luke warm, the organisms staphylococcus, candida albicans) were inoculated separately in separate nutrient agar media and poured aseptically into the sterile petridishes and allowed to solidify.

The filter paper discs impregnated with various compounds were placed on the surface. The standard drugs amikacin 5. (5 μg) disc and griseofulvin (5 μg) disc were placed on the surface of the media. It was kept in a refrigerator for a period of 1 hour and later kept in the incubator for a period of 24 hours at 37 °C and the zone of inhibition was observed.
RESULTS AND DISCUSSION

The plant family Rutaceae is composed of 100 genera and 800 species and distributed throughout the world. A search of literature revealed that most of the phytochemical screening is in the area of chemical constituents often referred to as carbazole alkaloids. These alkaloids are present in about six species. Although the genus Murraya has been investigated extensively, it is very obvious that there is little information on the alkaloid content of M. koenigii of South Indian regions. There appears to be no report on the other constituents of M. koenigii like coumarins, flavonoids etc. Therefore the phytochemistry and antimicrobial activity of the stem bark of Murraya koenigii were screened grown locally.

The compounds alkaloids and coumarins showed high antibacterial and antifungal activity when compared with the standard drug. The crude alcohol extract from the stem bark showed a very high degree of both antibacterial and antifungal activity. The alcohol extract fraction showed very high degree of antibacterial and antifungal activity.

ACKNOWLEDGEMENT

In recent years increased attention has been focused on the natural pesticides namely enzyme inhibitors. The role and importance of natural products and natural product research is now the main source of novel lead substances for drug design. The synthetic carbazoles role in cytotoxic studies can be an important impact in preparing natural product based libraries for combinatorial chemistry.

References
2. Goutam,M.P, Purohit,R.M, 1974 Ind.J.Pharm,36, 11
Author Information
Subin Mary Zachariah, MPharm(Pharmaceutical Chemistry)
Amrita School of Pharmacy, Amrita Viswavidyapeedam Deemed University

P.M. Muthumani
Department of Pharmaceutical Chemistry, K.M.College of Pharmacy

K.V. Ramaseshu
Department of Pharmaceutical Chemistry, K.M.College of Pharmacy