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PHYTOCHEMICAL ANALYSIS AND ANTIBACTERIAL ACTIVITY OF *GYMNEMA SYLVESTRE* AND *MORINDA PUBESCENS*

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Abstract

Tested two medicinal herbs, *Gymnema sylvestre* and *Morinda pubescens* for possible antibacterial activity against *Salmonella typhi, Bacillus subtilis, Escherichia coli, Klebsiella pneumoniae,* and *Staphylococcus aureus*. The disc diffusion method was used to assess the antibacterial activity in petroleum ether, chloroform, acetone, methanol, and aqueous extracts. The most inhibition was shown by the chloroform and methanol extracts of *Gymnema sylvestre* leaves against *Escherichia coli* and *Klebsiella pneumoniae*, respectively; the most inhibition was shown by the acetone extract of *Morinda pubescens* var. pubescens leaf against Pseudomonas aeruginosa. Alkaloids, flavonoids, phenols, tannins, and terpenoids were detected by phytochemical screening. The findings of these investigations provided extremely useful information and backed the continuous, sustainable application of these plants in conventional medical systems.

Keywords: *Gymnema sylvestre, Morinda pubescens* var. *pubescens*, antibacterial activity, disc diffusion method.

Introduction

Globally, there has been a recent surge in interest in plant study, highlighting the enormous

potential of medicinal plants utilized in diverse traditional systems (Dahanukar et al., 1999). Many chemicals with established therapeutic benefits are produced by traditionally used medicinal plants (Bruneton 1995). According to several studies (Ahmad et al., 1998; Ahmad and Beg, 2001; Aqil and Ahmad, 2003; Chendurpandy et al., 2011), the antibacterial qualities of Indian medicinal herbs have improved recently. Most historically used Indian medicinal plants, however, have not yet undergone a thorough screening process to protect against different microbiological infections. In the current investigation, several bacterial strains were used to examine the antibacterial activity of leaf and stem extracts from Gymnema sylvestre (Retz) R. Br ex. Schultes and Morinda pubescens var. pubescens J.E. Smith using the disc diffusion method [1-5].

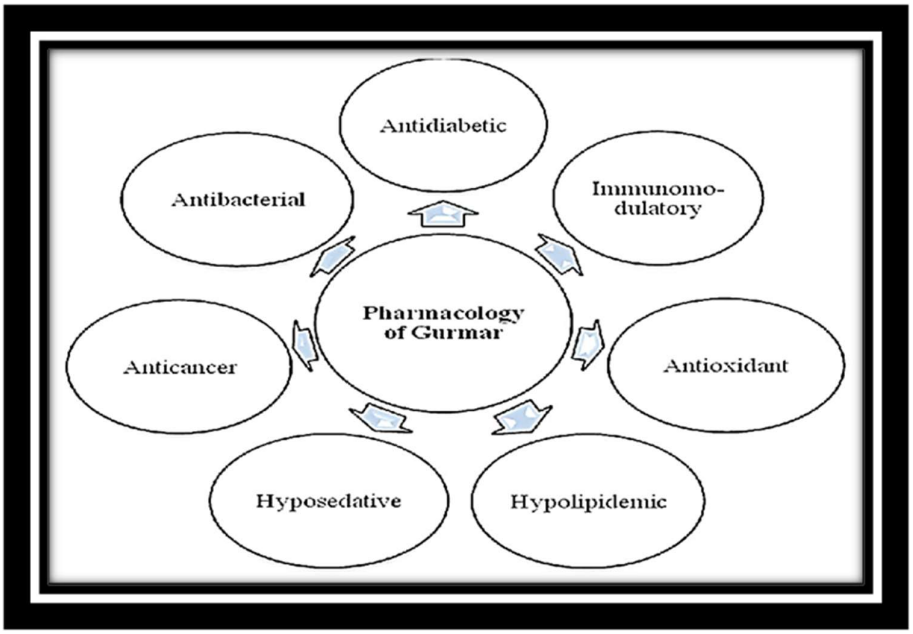

Figure 1: Pharmacological activities of Gymnema sylvestre

Materials and Methods

Utilization of Available Plant Resources

There are well-grown plants in the Western Ghats of Tamil Nadu. These plants were used to gather leaf and stem materials of Gymnema sylvestre, as well as leaf and stem bark of *Morinda pubescens var. pubescens*. They were allowed to continue drying in the shade at room temperature for ten to fifteen days.

Utilization of Plant-Based Materials

Many different organic solvents were utilized in the process of extracting the bioactive compounds. When using a Soxhlet apparatus, ten grams of powdered Gymnema sylvestre and Morinda pubescens var. pubescens leaves, stem, and stem bark were initially extracted with petroleum ether for the purpose of defatting this mixture. The defatted powder sample of Gymnema sylvestre and Morinda pubescens var. pubescens was effectively extracted in a Soxhlet apparatus by utilizing petroleum ether, chloroform, acetone, methanol, and water. This was done after the powder sample had been dried.

It was determined that the extracted components were completely evaporated by employing a vacuum rotary evaporator. In accordance with the techniques that are typically used, the

concentrated extracts were put through qualitative testing in order to determine the various phytochemical components that were present (Brindha et al., 1981; Anonymous 1996; Lala 1993). It was decided to make use of the antibacterial effectiveness of the concentrated extracts.

Microorganisms

The bacterial strains of *Staphylococcus aureus (MTCC 96), Klebsiella pneumoniae (MTCC 109), Bacillus subtilis (MTCC 441), Escherichia coli (MTCC 424), Pseudomonas aeruginosa (MTCC 443),* and *Salmonella typhi (MTCC 531)* were obtained from the microbial type culture. After an incubation period of forty-eight hours at 37 degrees Celsius on nutrient agar-slant (stationary cultures), the bacteria were then injected into Muller Hinton Agar (MHA) media following the incubation period.

Test for Antimicrobials

For the purpose of demonstrating antibacterial activity, a modified version of the approach developed by Bauer et al. in 1966 was applied (Barry and Thornsberry 1985). This method is commonly utilized for the assessment of antibacterial susceptibility. Following the removal of a loopful of bacteria from the stock culture, the bacteria were dissolved in 0.1 millilitre of saline. An initial inoculation was performed on the surface of the Muller Hinton Agar using ten millilitres of MHA liquid medium that included both Gram-positive and Gram-negative bacteria. Then, in order to carry out all of the tests, a disc with a diameter of six millimetres was placed on the surface. This disc was impregnated with twenty microliters of various crude solvent extracts. In the absence of any plant extracts, the negative controls consisted of comparable solvents. For the purpose of serving as a positive control or point of reference, tetracycline and chloramphenicol, two commonly used antibiotics, were utilized. Plating was done at 37 degrees Celsius for a period of twenty-four hours. Following the incubation period, measurements were taken, and the diameter of the inhibition zone surrounding the saturated discs with plant extracts was compared to the diameter of the inhibition zone surrounding conventional antibiotic discs that are available for purchase in the market [6].

Results and Discussion

Alkaloids, anthraquinones, catechin, coumarin, flavonoids, phenols, steroids, tannins, terpenoids, and xanthoprotein were found in the initial phytochemical analysis of the methanol extracts of Gymnema sylvestre's leaves and stem; on the other hand, Morinda pubescens var. pubescens' leaf and stem bark extracts showed the presence of alkaloids, coumarin, flavonoids, phenols, saponins, steroids, tannins, terpenoids, and sugar. Both Morinda pubescens var. pubescens and Gymnema sylvestre have antibacterial characteristics, and the leaf and stem bark extracts of both of these plants are powerful. The level of antibacterial activity that each extract possessed varied from one another. In both acetone and methanol extracts, the leaf and stem of G. sylvestre, as well as the leaf and stem bark of M. pubescens var. pubescens, were found to be effective against all six known infections. An antibacterial action was demonstrated by the petroleum ether extract of the leaf of G. sylvestre against S. aureus, B. subtilis, P. aeruginosa, and S. typhi. However, the stem extract of G. sylvestre was not able to inhibit K. pneumoniae, B. subtilis, or S. typhi. The chloroform extract of the leaf and stem of G. sylvestre shown effectiveness against every bacterium that was tested, with the exception of Botulina subtilis. When tested against S. typhi and K. pneumoniae, the aqueous extract of the stem of G. sylvestre showed no significant amount of effectiveness. The chloroform and methanol extracts of G. sylvestre leaf showed the highest inhibitory zone against K. pneumoniae and E. coli,

respectively. This observed inhibition was observed in both extracts. A petroleum ether extract of M. pubescens var. pubescens leaf displayed efficiency against S. aureus, B. subtilis, and S. typhi, however an extract of stem bark did not affect the growth of E. coli. K. pneumoniae and E. coli were not hindered from developing by stem bark extract; however, all of the microorganisms that were included in the study were active against leaf chloroform extract, with the exception of B. subtilis. P. aeruginosa and K. pneumoniae were both found to be susceptible to the aqueous extract of stem bark [7-9].

A leaf extract of M. pubescens var. pubescens that was extracted with acetone showed the biggest inhibitory zone when it was tested against P. aeruginosa. Tetracycline and chloramphenicol, two of the most commonly used antibiotics, were shown to have antibacterial activity that was comparable to that of the species that were investigated. Both plants have been shown to possess antibacterial qualities, which could be beneficial in the process of developing medications for the treatment of illnesses, according to the findings of the current study! It was observed that the extracts contained antibacterial plant components such as flavonoids, alkaloids, and tannins; however, the specific active element that was responsible for this activity was not immediately determined [11].

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