COMPARATIVE ANTIBACTERIAL ACTIVITY OF HYDROETHANOLIC EXTRACTS OF SOME INDIAN FLOWERS OF MEDICINAL IMPORTANCE

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ABSTRACT
Hydroethanolic extracts of Butea monosperma, Nerium oleander and Mesua ferrea, flowers were prepared and assessed for their antibacterial potentials on E. coli, S. aureus, Salmonella and P. aerugenosa at a static concentration of 400 µg/ml and the efficacy of inhibiting the growth of specific bacteria was evaluated using disk diffusion method on specific growth media. Flower extracts of all three plants found capable of inhibiting growth of all four pathogens, however N. oleander could not inhibited the growth of P. aerugenosa and Salmonella.

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INTRODUCTION

Humans are continuously at a risk of infection from different forms of pathogenic microorganisms. Bacteria are one of such pathogens that can infect human population at a great potential. Phytochemicals or active ingredients from many plant species possesses antimicrobial activity selectively inhibits the growth of infectious microorganisms. According to world health organization the four bacterial species have been declared human pathogen that can contaminate pharmaceutical and food preparations namely, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa and Salmonella species. Antimicrobial agents like antibiotics are very reliable source of combating against microbial infections, but indiscrimination and tissue lethality is a major drawback of using antibiotics. Another issue related to antibiotic therapy is the developing microbial resistance. Recent approaches in antimicrobial therapy currently focused on development of plant based antimicrobial agents such as extracts of various parts of plants, that found safe in administration as well as in their antimicrobial activity. In ancient medicine and ayurveda crude paste of medicinally important plants was directly applied on open wound or infected site, as well as an extract called ‘Quatha’ was orally administered in person infected to jaundice known as Pandu roga in Ayurvedic terminologies. Present study was attempted to evaluate and compare the antibacterial potentials of Hydroethanolic extracts of Butea monosperma, Nerium oleander, and Mesua ferrea flowers.

MATERIALS AND METHODS

Materials and Chemicals.

All the standard chemicals used in this study were purchased from Himedia labs, Merk ltd and SRL chemicals Ltd India.

Preparation of Extracts. Fresh flowers of B. monosperma, Nerium oleander and Mesua ferrea were thoroughly washed using tap water and rinsed with distilled water. The flowers were dried for 3 days naturally under shade to avoid any type of hindrance in antioxidant composition. The ethanol extracts were obtained by weighing out a fraction 20 g of the pulverized powdered flowers of the plant and soaking in 100 ml of the 60% ethanol and kept in dark for three days with occasional shaking to take out the extract. The extract was then filtered using Whatman no.1 filter paper. All filtrates were air dried at 28 oC for three days to obtain semi dried extracts.

Antibacterial activity

Test Microorganisms

Some common human pathogenic bacteria viz. E. coli, S. aureus, Streptococcus, P. aeruginosa and Salmonella sp were considered for in vitro evaluation of growth inhibition potential of flower hydroethanolic extracts.

Culture preparation for antibacterial assay

The cultures were grown on nutrient agar at 37 °C for 18 h and the colonies were suspended in saline (0.85% Nacl) and its turbidity was adjusted to 0.5 Mac Farland standards (108 CFU/mL). This saline culture preparation was used to inoculate the plates.

Disc diffusion

In the agar disc diffusion method the test compounds, i.e. the flower hydroethanolic extract were introduced into a disc 0.5 mm (hi-media) and then allowed to dry. Thus the disc was completely saturated with the test compound at concentration of 400 µg/mL. Then these discs were placed directly on the surface of Muller Hinton agar plates, swabbed with the test organism and the plates were incubated at 37 °C for 24 h.

Table 1: Antibacterial analysis of, B. monosperma, N. oleander, and M. ferrea flower hydroethanolic extracts 400 µg/ml, shown as zone of growth inhibition in mm on different human pathogens.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Bacteria</th>
<th>Control</th>
<th>B. monosperma</th>
<th>N. oleander</th>
<th>M. ferrea</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E. coli</td>
<td>0</td>
<td>13</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>S. aureus</td>
<td>0</td>
<td>13</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>P. aeruginosa</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Salmonella</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSIONS

Hydroethanolic extract of all flowers showed potent inhibition of all four pathogenic bacteria. The largest zone of growth inhibition was depicted by M. ferrea as 18mm on plate of S. aureus followed on growth of E. coli 17mm, Salmonella sp. 15 mm and P. aeruginosa 13mm in diameter. While N. oleander does not inhibited the growth of P. aeruginosa and Salmonella sp. (Table 1).

Plant based antimicrobial agents reflected potent inhibitory activity in pathological reactions of several microorganisms. Studies reported the potential inhibitory activity of Various extracts of different parts of B. monosperma plants on different clinically isolated multi drug resistant bacteria. Different solvent extracts of N. oleander founds to possess antimicrobial activities on growth of certain pathogenic bacteria in some earlier studies. Extracts of M. ferrea were assessed for their antimicrobial activities in vitro as well as in vivo and found very much potent in its activity as it could inhibit a large number of Gram-positive and Gram-negative bacteria at concentration ranges of 100 to 50 µg/ml, or even lower, as against vibrios and Escherichia coli and significantly

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reduce the viable count of the strain *Salmonella typhimurium* ATCC 6539 in liver, spleen and heart blood of the extract treated challenged mice.\textsuperscript{[11]} Flowers contains majority of bioactive compounds like coumarins and other phenolics like flavonoids, tannins and alkaloids etc which bears antimicrobial activity also. As reflected by our study that *M. ferrea* flower hydroethanolic extracts found most potent against all four pathogens \textit{in vitro}.

CONCLUSIONS

As reflected by the results and finding of the study, the extract of flowers possesses antibacterial activity against standard pathogens so attempts could be made employ these flower on other pathogens to develop the therapeutic agent against broad range of infections.

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Author’s contributions

Author 1st and 2nd equally contributed to accomplish the study.

REFERENCES