PHYTOCHEMICAL ANALYSIS AND ANTIBACTERIAL POTENTIAL OF LEAF EXTRACT OF BAUHINIA LINN.: AN ETHNOMEDICINAL PLANT

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ARTICLE DETAILS

ABSTRACT

Various agents in medicinal plants are used in the same way as antibiotics in treatment of acquiring resistance in bacteria. The main objective of this study is to check out the bactricidal action of leaves of Bauhinia variegata,inn against medically important one Gram positive (Staphylococcus aureus) and three gramnegative bacterial strains (Proteus vulgaris, S. typhi and E. coli) by the method of disc diffusion. This method showed 24-mm maximum zone of inhibition against Staphylococcus aureus, 18.5-mm against Proteus vulgaris, 20-mm in Escherichia coli and 17.5-mm in Salmonella typhi.Zone of inhibition of extract was compared with standard antibiotic Cephalosporin. The phytochemical screening of ethanolic extract revealed many secondary metabolites existence, like flavonoids, terpenoids, tannins, steroids, glycosides and anthraquinones. Various plants are considered medicinal importance as having microbial activity due to containing many secondary metabolites. So, the development of research achievements in pharmacy is enhanced due to naturally occurring bioactive compounds of these plants.

1. INTRODUCTION

Antibacteria The considerable origin for the invention of new and competent drugs that utilize around the world are traditional curative systems of herbal therapy. The rate of acquiring drug resistance is rising dangerously in last decades is one of the possible reason of health problems. Drugs resistance have been caused some antibiotics to become almost obsolete and consequently new drugs must be desired [2, 3]. Though a bulk of new antibiotics have been created by pharmacological industries in the previous three decades, yet microorganisms have developed resistance against these drugs. In general, the genetic capability of bacteria to spread and achieve resistance to drugs, may be appropriate as therapeutic agents [4]. Compounds within the herbal plants have been analyzed by numerous studies are effective antibiotics [5]. The considerable and challenging mission for medicinal chemists will consequently the exploring for new antimicrobial agents.

The important resources of natural antimicrobial compounds have considered as a large number of medicinal plants [6]. A vast untapped fountain for medicines are antimicrobials and antibacterial (plant based) and hence have colossal therapeutic potential. Therefore, curiosity on antimicrobial activity/exhibiting higher plant extracts has increased recent years [7-9]. Synthetic drugs are associated with many side effects, while antimicrobials drugs that found in plants have ability to reduce these adverse effects as well as improve treatment of these infectious disorders [10]. In pathogenic organisms, increased expression of multi drug resistance is due to indiscriminate use of antibiotics [11]. The synthetic antibiotics not only have high cost, but also have adverse side effects such as, allergic reactions, hypersensitivity immunosuppression etc, and in treating these infectious diseases are major burning global issues [12]. Although the commercial antibiotics had been invented by pharmacological industries time to time in considerable large number but pathogenic microorganism acquired resistance against these drugs at high rate and ultimately lead toward the situation of multi drug resistant in microorganism [13]. Diarrhea and septicaemias are caused by Escherichia coli and it can also infect the gall bladder, surgical wounds, meninges, skin lesions, and the lungs especially in debilitate and immuno-deficient patients. Urinary tract infections and wound infections are caused by Proteus spp, in both the old and young men by following cystoscopy, and in ulcers pressure sore type disorders they are secondary invader [14]. The hospital acquired infections are majorly caused by one of the class of gram positive round shaped bacteria that are Streptococcus aureus [15]. The surgical site infection and lower respiratory tract infections are primarily caused by it, pneumonia and myocardial infarctions are also caused by it [16]. The emerging resistant against antimicrobial drugs of especially Penicillin (β lactams) in S. aureus resulted in difficult to treat its infections [15]. Salmonella species is the source of salmonellosis disease [17]. The symptoms like acute onset of fever, diarrhea, abdominal pain, nausea and sometimes vomiting are the clinical sources of human salmonellosis. Salmonellosis disease is most commonly associated in animals especially in swine and poultry [18].

In national health care programmers traditional/herbal remedies are majorly recommends, boosts, and promotes by World Health Organization (WHO) because these drugs are safe, easily available at low cost, and people have faith in them [19]. Bauhinia variegata Linn (Leguminosae) has been selected in order to augment the range of naturally occurring antimicrobial agents. Bauhinia variegata, is the scientific name of Kachnar, is medium and of short duration tree found in India, China, Pakistan, and Nepal [20]. For their medicinal properties, its bark, roots, seed, flowers are mainly used. The cooling, acrid, constipating, antihelminthic, depurative, and anti-inflammatory are the medicinal properties of the roots and barks [21]. They are useful in treating certain diseases such as diarrhea, skin disease, dysentery, leprosy, wound, intestinal worms, ulcers, cough, tumors and antiabetic [22, 23]. In folklore medicine, various diseases like inflammation is easily managed by the use of this plant [24]. In present study, Proteus vulgaris, Escherichia coli, Salmonella typhi and Streptococcus aureus are taken as tested strains to check the antibacterial activity of plant extract Bauhinia variegata.

2. MATERIAL AND METHOD

2.1. Plant collection and authentication
Sample leaves were collected in month of June from Emerson College Bosan Road, Multan. The shape of different parts of plant (i.e.) apex, margin, leaves base etc was examined morphologically by etch taxonomic experts from Department of Botany, Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan.

2.2. Plant extract preparation

Leaves were washed with tap water and placed under shaded area for drying. These were collected as they became crispy and subjected to grind to obtain a fine powder. This was then, stored in polythene bag to use in further processes. For extraction purpose 300g of powdered leaves soaked in ethanol-distill water (70-30%, v/v). Sample solution was tightly closed with lid to avoid evaporation of ethanol and well shock to homogenize all mixture by placing at room temperature. During this mixture was occasionally shaken by hand. After 7-15 days soaking process vegetative debris was passed through Whatman an filter paper. To get crude extract solvent was evaporated with rotary evaporator under reduced pressure. Hence a thick sticky concentrated paste was collected in bottle jar which was kept at 4°C until tested or utilized.

2.3. Antimicrobial assay

Bactericidal action of extracts of plants was examined by using disc diffusion method [25,26]. Briefly, nutrient agar and MacConkey agar are used media to culture the bacteria. Sterilized cotton swab dipped into freshly prepared inoculums and streak three times at 60° by opening the lid of agar plates against flame in a semi-confluent lawn. Sterile paper discs (6 mm) (Himedia) saturated with extracts (20 μL) prepared in DMSO (having different concentrations) were aseptically placed on the upper layer of the inoculated nutrient agar and MacConkey agar surfaces, and plates were reincubated for 24 hour. Inhibition zones were appeared around the discs after 20-hour incubation which was recorded by zone reader in mm. Results were compared with standard antibiotic Cephalosporin. 20μL DMSO in each disc was taken as a negative control. Results are described as mean ± standard deviation by performing Antimicrobial assay in triplicates.

2.4. Phytochemical screening

To identify the chemical constituents using standard method of Harborne and Kocate, stock solution of leaves of Bauhinia variegata was subjected with various chemical tests.

3. RESULTS AND DISCUSSION

Antimicrobial assay determined that leaf extract of B. variegata is more productive against Gram (+ve) bacteria in comparison to Gram (-ve) bacteria. Maximum zone of inhibition recorded for S. aureus was 25mm at 0.8mg/ml and minimum zone of inhibition was 17mm at 0.7mg/ml respectively illustrated in Figure. 1. Maximum zone of inhibition recorded for S. typhi was 17.5mm at 0.9 and 0.8mg/ml respectively illustrated in Figure. 1. Maximum zone of inhibition was remained independent to concentration of leaf extract. It would be interesting to note that resistance shown by bacterial strains was remained independent to concentration of extract.

According to one more research degree of variability of antimicrobial activity is dependent on the presence of phytochemical constituents extracted by solvent [8]. Flavonoids are synthesized in feedback of microbial infections by plants, and are hydroxylated phenolic metabolites [29]. Many plants contain nontoxic glycosides, phenolics were released by hydrolyzing glycosides, which are lethal to microbial germs [30]. Antibacterial activity is also the property of terpenoids, exhibited by membrane integrity weakness and proton motive force dissipation [31]. Therefore, the presence of these phenolic compounds could justify the antibacterial activity observed in B. variegata.

Table 1: Representation of the antibacterial efficacy at different concentration of Bauhinia variegata’s leaves extract

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Bacterial strains</th>
<th>Concentration (mg/ml)</th>
<th>Ethanol extract (DZOI:mm)</th>
<th>Standard</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>G+ve</td>
<td>0.9</td>
<td>24</td>
<td>39</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.8</td>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G+ve</td>
<td>0.7</td>
<td>17</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Proteus vulgaris</td>
<td>G+ve</td>
<td>0.9</td>
<td>14.5</td>
<td>37.5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.8</td>
<td>18.5</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>G+ve</td>
<td>0.7</td>
<td>15.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.6</td>
<td>10.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>G+ve</td>
<td>0.9</td>
<td>20</td>
<td>36.5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.8</td>
<td>18.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G+ve</td>
<td>0.7</td>
<td>15.5</td>
<td>-</td>
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</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.6</td>
<td>10.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td>G+ve</td>
<td>0.9</td>
<td>17.5</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>G-ve</td>
<td>0.8</td>
<td>14.5</td>
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<td></td>
<td>G-ve</td>
<td>0.6</td>
<td>17</td>
<td>-</td>
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</tr>
</tbody>
</table>

Figure 1: Graphical illustration is given to represent antibacterial activities by different strains of bacteria

Table 2: Phytochemical study of Bauhinia variegata’s leaves extract

4. CONCLUSION

**Bauhinia variegata** and other herbal medicines would be a substitute of antibiotics which are becoming non-functional now a day with the emergence of resistance in pathogenic bacteria. This study needs further elaboration by applying it on animal models/ specimens directly to demonstrate the effects of **Bauhinia variegata**.

**REFERENCES**


