Microbiological Studies on Some Herbs Used in Folk Medicine

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Abstract: The use of plants in treatment of burns, dermatophytes and infectious diseases is common in folk medicine. With the hazard use of antibiotics, microorganisms have become resistant. In addition to this problem, antibiotics are sometimes associated with adverse effects on host which include hypersensitivity, immunosuppression and allergic reactions. The development of new antimicrobial agents against resistant pathogens is increasing interest. Therefore, the hot and cold aqueous extracts from different parts of five medicinal plants used in folk medicine were evaluated for antimicrobial activity. It was found that all plant extracts studied had no any antibacterial or antifungal activities except the cold extract of Rhazya stricta which showed significant antibacterial activity against E. coli. The cold and hot extracts of Commiphora myrrha, Rhamnus frangula, Nigella sativa, Salvia officinalis showed no significance against Candida albicans & E. coli which were resistant to these extracts. It could be concluded that the cold aqueous extract of Rhazya stricta have a significant antibacterial activity against E. coli.

Key words: Commiphora myrrha • Rhamnus frangula • Nigella sativa • Salvia officinalis • Rhazya stricta antibacterial • New antibiotic • Antifungal

INTRODUCTION

Morbidity and mortality due to diarrhea continues to be a major problem in many developing countries. Infections due to variety of bacterial etiologic agents such as pathogenic Escherichia coli (E. coli), Salmonella spp. and Staphylococcus aureus (S. aureus) are most common. In recent years drug resistance to pathogenic bacteria has been commonly reported from all over the world [2-4] Also systemic fungal infections (fungemias) including those by Candida albicans (C. albicans) have emerged as important causes of morbidity and mortality [5].

With the hazard use of antibiotics microorganism have become resistant. In addition to this problem, antibiotics are sometimes associated with adverse effects on host which include hypersensitivity, immunosuppressant and allergic reactions [6]. This has created immense clinical problems in the treatment of infectious diseases [7]. Therefore, there is a need to develop alternative antimicrobial drugs for the treatment of infectious diseases; one approach is to screen local medicinal plants for possible antimicrobial properties. The traditional medicinal methods, specially the use of medicinal plants, still play a vital role to cover the basic health needs in the developing countries [8]. Since ancient times, herbs and their essential oils have been known for their varying degrees of antimicrobial activity [9] There are many published reports on the effectiveness of traditional herbs against Gram-positive and Gram-negative microorganisms and as a result plants are still recognized as the bedrock for modern medicine to treat infectious diseases [10].

Peganum Harmala (Rhazya Stricta): Harmal may have been used as an entheogen in the Middle East in ancient times. Smoke from the seeds kills algae, bacteria, parasites and molds [11]. Peganum harmala has "antibacterial activity, [12] including antibacterial activity against drug-resistant bacteria [13].

Myrrh: Myrrh is the aromatic oleoresin of a number of small, thorny tree species of the genus Commiphora, [14] Myrrh has been used as an antibacterial and anti-inflammatory agent [15].
**Rhamnus Frangula:** Galen, a Greek physician of the 2nd century A.D., knew of Alder Buckthorn, mentioned in his writings that Alder Buckthorn and other plants have power to protect against witchcraft, demons, poisons and headaches. The bark has been used as a laxative [16].

**Nigella Sativa:** Black cumin is regarded as a valuable remedy for a number of diseases. Sayings of the Islamic prophet Muhammad (PBUH) underline the significance of black cumin. According to a hadith narrated by Abu Hurairah, he says, "I have heard the Messenger of Allah, saying that the black granules (kalonji) are the remedy for all diseases except death." [17] The seeds of Nigella sativa are used in folk (herbal) medicine all over the world for the treatment and prevention of a number of diseases as asthma, diarrhea and dyslipidaemia [18].

**Salvia Officinalis:** Salvia and "sage" are derived from the Latin salvere (to save), referring to the healing properties long attributed to the various Salvia species.[19] It has been recommended at one time or another for virtually every ailment by various herbs. Modern evidence shows possible uses as an antisweating agent, antibiotic, antifungal, astringent, antispasmodic, estrogenic, hypoglycemic and tonic [20].

**MATERIALS AND METHODS**

**Collection of Plant Materials:** Seeds & papers of selected plants were purchased from markets. The plant parts were washed twice with distilled water.

**Aqueous Extraction:** About 5g of each selected plant and 10 ml of each hot and cold water was added to them in sterile test tubes. The tubes were kept for 1 week at room temperature until use.

**Preparation of Inoculums:** The Gram negative bacteria (e.g. E. coli) & fungi (e.g. C. albicans) were inoculated in Sabaroud dextrose agar (SAB) (Purchased from Witan - Biolife Company produced by Jalil Medicals Company) & nutrient broth (Purchased from Witan - Biolife Company produced by Jalil Medicals Company).for overnight at 37 °C for bacteria & 25°C for fungi. Then as a confirmatory method, E.coli was cultured on MacConkey agar and C. albicans on potato dextrose agar for 48 hr at 37 °C for E. coli and at 25 °C for Candida.

**Antimicrobial Screening:** The preliminary study of antimicrobial activity of hot and cold aqueous extracts of all herbs was performed by using agar disk diffusion [21]. The sensitivity of both extracts were tested against E. coli and C. albicans. The antimicrobial activity was measured by the inhibition zones produced in milliliter. All experiments were duplicated. Ciprofloxacin (10 µ g) (Purchased from Witan - Biolife Company produced by Jalil Medicals Company) used as positive control while distilled water (100 µg) used as negative control for antibacterial screening. Nystatin (10 µg) (Purchased from Witan - Biolife Company produced by Jalil Medicals Company) was used as positive control while distilled water (100 µg) used as negative control for antifungal screening.

**RESULTS**

This investigation of antimicrobial activity was performed on five selected medicinal herbs (Table 1). The screening step in the preliminary study for antimicrobial activity was the Agar Diffusion Method. This test was used in order to determine antimicrobial activity of hot & cold aqueous extracts. The diameter of the clear zone indicated the inhibition activity. Only one of the plants tested showed antibacterial effect against
Table 1: List of herbs used to evaluate antimicrobial activity.

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Parts of plant used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peganum harmala (Rhazya stricta)</td>
<td>Seeds &amp; papers</td>
</tr>
<tr>
<td>2</td>
<td>Myrrh</td>
<td>Pieces</td>
</tr>
<tr>
<td>3</td>
<td>Rhamnus frangula</td>
<td>Minced papers</td>
</tr>
<tr>
<td>4</td>
<td>Nigella sativa</td>
<td>Seeds</td>
</tr>
<tr>
<td>5</td>
<td>Salvia officinalis</td>
<td>Papers</td>
</tr>
</tbody>
</table>

Table 2: Antimicrobial activity of aqueous herbal extract against E. coli and C. albicans isolates.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Antibacterial control positive</th>
<th>Antifungal control positive</th>
<th>Antimicrobial control negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rhazya stricta</td>
<td>Myrrh</td>
<td>Rhamnus frangula</td>
</tr>
<tr>
<td>E. coli</td>
<td>Hot</td>
<td>+35 mm</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Cold</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>Hot</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Cold</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(+ = with clear zone, - = no clear zone)

Table 3: Diameter (mm) of zone of inhibition produced by Rhazya stricta against E. coli comparing with reference drug ciprofloxacin.

<table>
<thead>
<tr>
<th>Micro-organism</th>
<th>Rhazya stricta</th>
<th>Ciprofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>35</td>
<td>31</td>
</tr>
</tbody>
</table>

E. coli in cold extract (Table 3). For antifungal activity against Candida albicans, all plants including Rhazya stricta showed no activity in both hot & cold extracts (Table 2). Rhazya stricta (HARMAL) showed high antibacterial activity in the screening step (Table 3) comparing with ciprofloxacin.

**DISCUSSION**

There is resurgence in the use of herbal medicines worldwide. An estimated one third of adults in the Western world use alternative therapies, including herbs. These herbs may be used either in their primary forms or combined in mixtures. In contrast to chemical drugs, herbs have sometimes been claimed to be non-toxic, because of their natural origin and long-term use as folk medicines. However, problems may arise due to intrinsic toxicity, adulteration, substitution, contamination, misidentification, drug-herb interactions and lack of standardization [22]. This unfavorable fact urges the study of medicinal plants and plant derived compounds used in medicine and food industry. Despite the development of antibiotics, bacterial and fungal infections are still a major issue in medicine and the presence of multidrug resistant strains poses a great challenge. Recently, there has been a growing interest in natural products due to their availability and better biodegradability. In this regard, essential oils may offer a great potential and these plant secondary metabolites may be used as alternative anti-infective and food preservatives [23].

The study was performed to investigate the antimicrobial activity of some medicinal plant extracts to E. coli & C. albicans isolates. All of the presumptive hot & cold aqueous extracts of medicinal herbs showed no significance antifungal activity against C. albicans.

There are many reports available in literature stating the sensitivity of various bacteria towards these herbs and spices used in food preparations [24].

Most of these studies involve extraction of the active component in the herbs using organic solvents. But herbs as used in folk medicine, the antibacterial properties using organic solvent extraction should not be a criterion; therefore, in the present study the commonly used herbs extracts are made with distilled water and tested for its antimicrobial effect against E. coli and Candida albicans.

Almost all plants used in the traditional medicine exhibited moderate antimicrobial activities when tested individually as reported earlier [25] except Rhysza stricta and Cuscuta reflexa. Little is known regarding antimicrobial activities of Rhysza stricta and Cuscuta reflexa according to Wondill Froman [26]. However Rice and Patty study [14] confirms their antimicrobial (bacteriostatic) potential. Although their antibacterial activities were found less by Paul [27].

Considering the previous results, our result was determined the maximum antibacterial activity in Rhazya stricta (HARMAL) against E.coli as shown in Table (3). However the antibacterial activity of different medicinal
plant parts extracts of four plants (Commiphora Myrrh, Rhamnus frangula, Nigella sativa and Salvia officinalis) was screened against the most common pathogen E.coli. In general, it is appeared to be non effective sources of antibacterial agents as shown in Table (2). Therefore, research in this area should be focused on the optimization of purification and applications to obtain effective antimicrobial activity at sufficiently low concentrations so as not to adversely influence the health.

Also this study suggested that herbs with unique chemical compounds that can either inhibit the growth of pathogens or kill them considered as potential candidates for developing new antimicrobial drugs.

CONCLUSIONS

The potential of Rhazya stricta (HARMAL) as natural antibacterial agent against E.coli has been confirmed. Four of the five selected medicinal herbs used in folk medicinal treatment (Commiphora Myrrh, Rhamnus frangula, Nigella sativa and Salvia officinalis) showed no significance as antibacterial against E.coli. All selected medicinal herbs used in folk medicinal treatment. Commiphora Myrrh, Rhamnus frangula, Nigella sativa, Salvia officinalis and Rhazya stricta (HARMAL) showed no significance as antifungal against C.albicans. Further studies on active compound identification and suitable purification of these medicinal plants are suggested. With the increase of the awareness of people using these herbs in treatment by the suitable sterilization method to use these herbs to be more effective with taking in consideration that there are some highly pathogenic strains which have high resistance to a lot of antibiotics even the treatment with these herbs. These results supported the claimed folklore use of these plants for some of the mentioned therapeutic purposes. The detailed fractionation, isolation of the active constituents and their toxicity studies are however, necessary to justify the safe use of these herbal drugs.

REFERENCES


