JOURNAL OF PURE AND APPLIED MICROBIOLOGY, March 2013. Vol. 7(1), p. 739-743

Study of Antimicrobial Activity of Some Allopathic, Unani and Homeopathic Drugs

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(Received: 07 February 2013; accepted: 17 March 2013)

The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for alternative. The proper use of herbal drugs is one of the most important alternatives. In the present study we have evaluated the antimicrobial activity of twelve herbal and traditional drugs against 5 bacteria and 4 fungi. The sensitivity of microbes against selected drugs was determined by the agar well diffusion method and minimum inhibitory concentration (MIC) were noted for each sample. Among the tested drugs, Surficol showed no activity against any of the bacteria but was only active to fungi *A. Parasiticus* and *C. Albicans.* While Zubex was inactive to all fungi. The largest zone inhibition for the standard antibiotic Nilstat was measured against the bacterium *E. coli,* that is 32 mm. While for Ampiclox the largest zone of inhibition was 24 mm against *E. Coli* and *B. Abortus.* From the present observation it is suggested the selected drugs have great potential against microorganisms. Therefore, industries are encouraged to focus on the efficacy of herbal formulations instead of synthetic drugs.

Key words: Human pathogens, Allopathic, Unani, Homeopathic Drugs.

Antimicrobial activity is the ability of a substance to inhibit or kill microbial cells. Different types of antibiotics and chemotherapeutic agents are being used in the treatment of one form of disease or the other.[1] Most of the microbial infections are cured by antibiotics. There was a belief in the medical organization that the discovery of antibiotics as chemotherapeutic agents would lead to the ultimate suppression of infectious diseases. The main aspect for the appearance and propagation of multi-drug resistant strains of several groups of microorganisms is the frequent use of antibiotics which is inactive against some microorganism i .e. fungi, viruses, nematodes, bacteria etc.[2,3] These microorganism cause serious infections in human body of tropical and subtropical countries of the world.

Intensive efforts have been made over the last three centuries to discover clinically useful antimicrobial drugs.[4-6]

Botanical medicine or phytomedicine also called Herbal medicine are of great interest for the researchers because different parts (seeds, berries, roots, leaves, bark, or flowers) of such plants have immense potential to relieve physical and psychological problems.

Although many modern drugs were originally developed from plants, they are based on isolated chemicals, while plants comprise active components, which work together to create their

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medicinal actions. Herbs have a long history to be act as curing agents for various diseases and when used properly is safe and powerful medicines[7-8].

The most common alternative of clinical medicines is perhaps the herbal remedies. In fact, almost every nation have at one time used herbs for the treatment of various sorts of diseases.[9-11] Due to the rare chances of side effects of herbal medicine, its demand is increasing day by day.[12] According to World Health Organization (WHO) approximately 80 % of the world's population are using herbal medicine for primary health care.[13]

The use of traditional remedies for the treatment of diseases is an age old art, but has been limited in the last century due to the development of access western biomedicine which provide them employment opportunities and ultimately economic growth.[14] But large population of the world are unhappy with the side effects of traditional medicine and starting to reconsider the herbal cure.

The traditional medicines playing a significant role in providing health care to a large part of the population in Pakistan and have been a strong part of our cultural heritage. However, the need of intensive efforts for proper utilization of traditional medicines in the health care system is still required. Primarily three categories i.e. Tibb-e-Unani, Ayurveda and Homoeopathy are in vogue whereas Chinese Traditional System, Reiki, Acupuncture and aromatherapy has been introduced in certain parts of the country in the last few years.[15] Therefore, it is necessary to reevaluate the action and efficacy of the commercially available formulations which are in use for centuries.

EXPERIMENTAL

Collection of Drug Samples

The selected Drugs i.e. *Silicea 6X, Surficol, Sore Throat, Zubex, Aller-Z, Toofit, Qurse-Suzak, Safoofe-bars, Histamine, Leuko plus, Nilstat* and *Ampiclox,* were purchased from the local markets of Kohat and Peshawar.

Microorganisms used

Among the microorganisms tested were 5 bacteria and 4 fungi, which were obtained from Department of Microbiology and Institute of Pharmaceutical Sciences (IPS), KUST. The bacteria used were *Staphylococcus aureus* (ATCC 6538), *Escherichia coli* (ATCC 8739), *Pseudomonas aeruginosa* (ATCC 9027), *Salmonella typhi* and *Brucella abortus* while the fungi were *Aspergillus Parasiticus, Candida albicans, Alternaria* and *Fusarium Solani.* All the microorganisms were pre-cultured.

Preparation of Drug Solution

All the drugs were crushed into fine powder with a mortar and pestle by hand separately. 5 gm of each drug was soaked in 50 mL of absolute alcohol for 40 to 50 hours. Each extract was stirred every 10 to 12 hours using a sterile glass rod and filtered through Whatman filter paper. The alcoholic extract obtained was concentrated on water bath at 40 °C and was left for solidification. A stock solution i.e. 10 mg/mL of all the drug extracts was made in Dimethylsulfoxide (DMSO) and diluted to various concentrations for the determination of Minimum Inhibition Concentration (MIC).

Culture Media Preparation

The medium used for the activation of Bacteria & Fungi was Nutrient Agar (Oxoid CM003) & Nutrient Broth respectively. All culture media was prepared and treated according to the manufacturer's guidelines. The media along with the required materials was sterilized in autoclave at 121°C for 30 minutes and was then transferred to sterile Petri dishes.

Antimicrobial susceptibility testing

For antimicrobial activity testing, the modified agar well diffusion method as describes by Perez *et al.* (1990) was followed[16]. To get uniform distribution of bacteria inoculum suspension was spread over the agar medium using sterile cotton swabs. At a distance of 1-2 cm from the periphery of the plates wells of 8 mm diameter were made in the solidified media by a flamed cork borer. Wells were filled by pouring the drug solutions through a micropipette. 100 µl of drug solution was poured into respective wells. All this process was carried out in aseptic condition in a laminar air flow. The Petri dishes were then incubated at 37 °C for 24 hours in case of bacteria and at 25 °C for 48 hours in case of fungi. The standard antibiotics (Ampiclox and Nilstat) were also run side by side in the same Petri dishes. After the incubation time completed, the activities were measured in millimeter in term of zone of inhibition by a metallic ruler. MICs of drugs against bacteria were determined by agar tube dilution method.[17]

RESULTS AND DISCUSSION

The antibacterial and antifungal activities of all herbal drugs in comparison to allopathic standard antibiotics were assessed by the zone of inhibition and are given in Tables and Figures (1 and 2 respectively). All drugs were significantly active against most of the bacteria but some were inactive for example Surficol showed no activity against any of the bacteria. *Salmonella typhi* was resistive towards Silicea 6X, Surficol and Zubex, *Escherichia coli* to Zubex, Leuko plus and Toofit, While *Pseudomonas aeruginosa, Staphylococcus aureus* and *Brucella abortus* were only resitive to Surficol. The highest antibacterial activity was shown by Nilstat and Ampiclox followed by Qurse-Suzak, Aller-Z, Safoofe-Bars and Histamine. Maximum zone of inhibition was observed for Nilstat against *E. coli* which is 32 mm and Qurse-Suzak against *Pseudomonas aeruginosa,* where the zone of inhibition was 22 mm. While for Ampiclox the largest diameter of zone of inhibition was 24 mm against *E. coli* and *B. abortus.*

Table 1. Antibacterial Activity of Tested Drugs (10mg/mL)

Drug	Zone of inhibition against test microorganism (mm)				
Name	ST	EC	SA	PA	BA
Silicea 6X	N/A	14	13	12	12
Surficol	N/A	N/A	N/A	N/A	N/A
Aller-Z	16	18	16	16	17
Sore Throat	11	14	14	14	12
Zubex	N/A	15	12	12	10
Histamine	12	13	13	14	14
Safoofe-Bars	14	14	16	15	16
Qurse-Suzak	17	13	22	14	18
Leuko Plus	13	N/A	14	14	11
Toofit	12	N/A	12	14	13
Ampiclox	23	24	21	22	24
Nilstat	25	32	24	25	26

ST = *Salmonella typhi*, EC = *Escherichia coli*, SA = *Staphylococcus aureus,*
PA = *Pseudomonas aeruginosa,* BA = *Brucella abortus,* N/A = No Activity

Table 2. Antifungal Activity of Tested Drugs (10mg/mL)

Drug	Zone of inhibition against test microorganism (mm)			
Name	AP	FS	Alt	CA
Silicea 6X	12	N/A	N/A	12
Surficol	14	N/A	N/A	10
Aller-Z	25	N/A	16	16
Sore Throat	11	N/A	14	12
Zubex	14	N/A	N/A	N/A
Histamine	16	N/A	14	16
Safoofe-Bars	14	N/A	13	17
Qurse-Suzak	14	N/A	14	17
Leuko Plus	N/A	N/A	11	N/A
Toofit	N/A	N/A	13	14
Ampiclox	22	20	22	24
Nilstat	23	28	26	29

AP = *Aspergillus parasiticus,* FS = *Fusarium solani,*
Alt = *Alternaria,* CA = *Candida albicans,* N/A = No Activity

Among the fungi species, *Fusarium solani* was completely resistant to all drugs but only sensitive to standard antibiotics, Ampiclox and Nilstat, where the zone of inhibition was 20mm and 28mm respectively. None of the drugs was active against all fungi. Zubex was only active to *Aspergillus parasiticus* where the zone of inhibition is 14mm while rests of the fungi were not sensitive to Zubex. Leuko plus drug was also active to only one fungus, *Alternaria* where the zone of inhibition measured is 11mm.

The maximum antifungal activity was shown by the drug Aller-Z which was active against three fungi, *Aspergillus parasiticus, Candida albicans* and *Alternaria* with maximum zone of inhibition of 25, 16 and 16 mm respectively. Safoofe-Bars, Qurse-Suzak, Histamine and Sore Throat showed moderate activity against *Aspergillus parasiticus, Candida albicans* and *Alternaria.* Silicea 6x showed low activity against *Candida albicans* and *Aspergillus parasiticus* where the zone of inhibition was 12 and 12mm, But showed no activity against *Alternaria* and *Fusarium solani*. While Toofit was active against *Alternaria* and *Candida albicans* and inactive to *Aspergillus parasiticus* and *Fusarium solani.* The results show that the fungi *Aspergillus Parasiticus* and *Candida albicans* are most sensitive to almost all drugs as well as to standard antibiotics. The highest zone of inhibition was measured for standard antibiotics Nilstat and Ampiclox which is 25mm and 23mm respectively against fungi *Candida Albicans.*

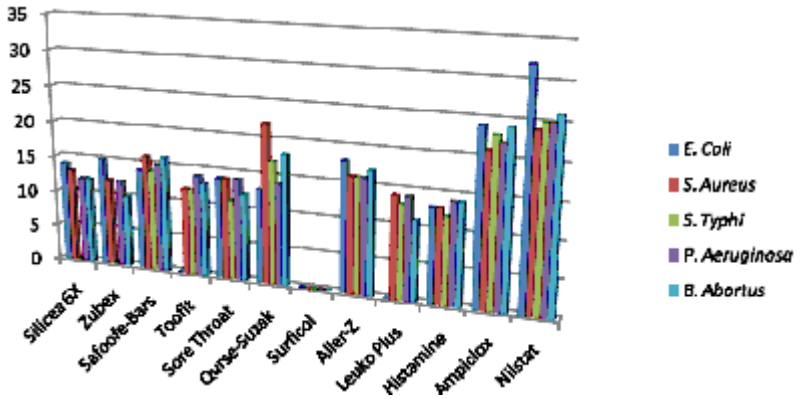

Fig. 1. Antibacterial activity of tested drugs against bacteria

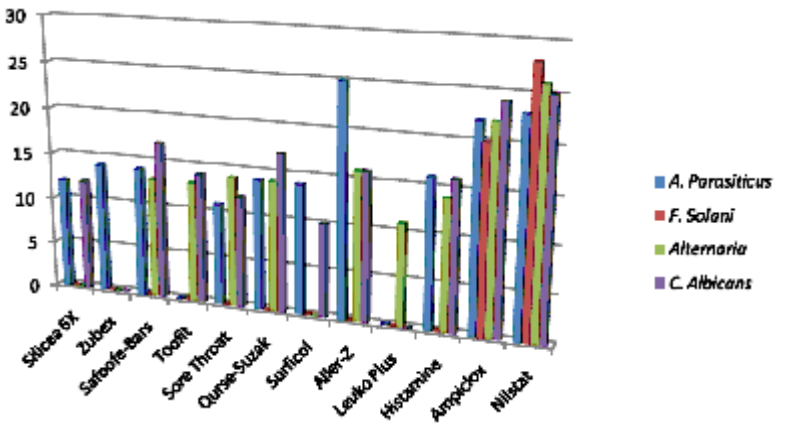

Fig. 2. Antibacterial activity of tested drugs against fungs

CONCLUSION

Traditional herbal medicines are used extensively, but as they lack modern scientific evidence, they are not accepted by conventional practitioners. From the results of this study it is concluded that the selected traditional drugs possess average and significant antibacterial and antifungal activity, can be used easily accessible source of natural antibiotics against microbial infections. However, the components responsible for the antibacterial and antifungal activity are currently unclear, further study should be performed to identify the mechanisms underlying the activities observed and also on the isolation and identification of phyto-constituents, toxicity and other pharmacological studies to explore the utilization of these traditional herbal medicines.

ACKNOWLEDGEMENTS

Authors are thankful to the College of Science Research Centre Deanship of Scientific Research King Saud University Riyadh for funding this research work.

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