Comparative Screening Of Minimum Inhibitory Concentration Of Different Antibiotics And Plant Extracts For Clinical Isolates

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Abstract

Antibiotics give immediate cure, but have side effects. Most of the plant extracts have antibiotic activity. Here the work done is to compare the efficacy of both antibiotics and the plant extracts for different pathogens isolated from clinical specimens. For this 125 different clinical specimens were collected from hospital (pus-25, urine-50, sputum-25, throat swab-25). All the clinical specimens were processed; the isolated microorganisms were identified using staining and biochemical tests. The following organisms predominant for all clinical specimens (*E-coli, Pseudomonas sp., Proteus sp., Klebsiella sp., Staphylococcus sp., Streptococcus sp.). .)* MIC of different antibiotics was determined against clinical isolates was performed by standard method. Plants like *Achyranthes aspera, Adhatoda vasika, Aloe indica, Andropogon muricatus, Boerhaavia diffusa, Calotropis gigantea, Cardiospermum halicacabum, Cephaelis ipecacuanha, Cocculus cordifolius, Gendarussa vulgaris* were selected. Fine powder of air dried specimen was extracted with methanol and it was concentrated. MIC was then determined by using different concentrations. By comparing both the results, the extracts of 4 plants showed antibiotic activity against all isolated pathogens and rest all plants showed activity against minimum 5 pathogens. But in case of antibiotics, only 3 of them showed activity against all the organisms. Thus the present study concluded that the herbal medicines are better than antibiotics.

Key words: Antimicrobial Agent, Plant extract, Clinical specimen, Minimum Inhibitory Concentration (MIC)

I. INTRODUCTION

Antimicrobial agents are the wonder drugs of the 20th century. However, through massive and increasing use of antimicrobials in human, resistance problem has been created that is rapidly moving to the forefront in public health concerns. Herbal medicine is the oldest form of health care known to mankind. In the past decade, the public interest in herbal medicines has increased greatly in industrialized countries. Plants are a storehouse of chemicals which can save from diseases by destroying the disease causing organisms. Substances derived from the plants remain the basis of a large proportion of the chemical medications used today for the treatment of heart disease, high blood pressure, pain, asthma and other problems.

The minimum Inhibitory Concentration (MIC) measures the lowest concentration of an Antibiotic that inhibits the visible growth of test micro organisms. The present study deals with the comparative screening of MIC from selected ten antibiotics and selected ten plant extracts using different clinical isolates.

II. MATERIALS AND METHODS

Samples like pus, urine, sputum, throat swab were collected and micro-organisms were isolated to analyze the Minimum Inhibitory Concentration of isolated micro-organisms against antibiotics and plant extracts in different concentrations.The bacterial pathogens in various clinical specimens were isolated by the streak culture (Quadrant streaking). The isolated pathogenic micro-organisms were identified by primary identification methods such as simple staining, Gram staining, Motility determination (Hanging drop method).

Bio-chemical identification methods such as Indole test , Methyl red test , Voges Proskauer test, Citrate utilization test, Urease test, Catalase test, Cytochrome oxidase test, Coagulase test, Gelatinase test, Starch hydrolysis, Triple Sugar Iron Agar test, Carbohydrate Fermentation test were carried out to identify the different bacteria from the clinical specimens. Later, various appropriate selective media were used for the identification of clinical isolates. The growth *of E-coli, Pseudomonas, Proteus sp., Klebsiella sp. Staphylococcus sp., Streptococcus sp.* on the selective media was noted.

MIC determinations were performed by using different antibiotics. Antibiotics such as Tetracycline, Streptomycin, Chloramphenicol, Oflaxacin, Pefloxacin, Norfloxacin, Vancomycin, Levofloxacin, Co-trimaxazole, Amikacin were selected, antibiotics discs were prepared in different concentration and MIC determination was done by using standard method. Then MIC determination was done using medicinal plant extracts such as Achyranthes aspera, Adathoda vasika, Aloe indica, Aedropogon muricatus, Boerhaavia diffusa, Calotropis gigantean, cardiospermum halicacabum, cephaelis

specacuanha,Cocculus cordifolius, Geadarvisa verlgaris. The fine powder of air dried specimens were extracted three times with boiled methanol and the extract was then concentrated into reduced pressure to yield dense residue. The isolated organisms from the different clinical sample were swapped on the Muller Hinton agar plate and dried at 37*C for 30 min. Then wall of 6 mm in diameter was properly made. As a precaution for not missing any trace amount of antimicrobials, different concentration from 5mg, 10 mg, 20 mg, 40 mg, 50 mg of each extract was prepared in dimethyl sulfloxide (DMSo) Methanol (1:1 v/v) solvent and administered to fullness of each wells. After 48 hours MIC was determined but the measurement by the diameter of inhibition zone in millimeter.

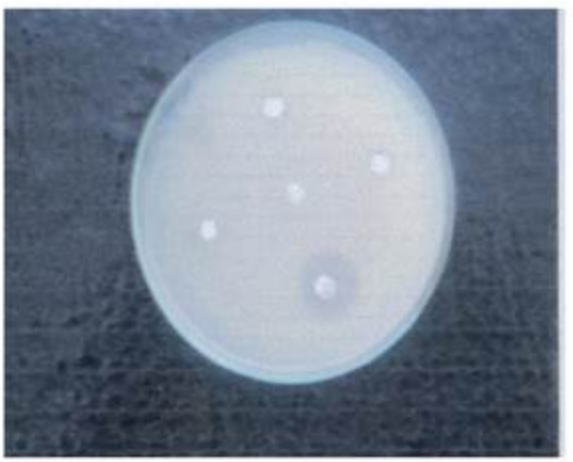
III. RESULTS

The organisms such as *Proteus sp., Klebsiella sp, Staphylococcus sp and Streptococcus sp.* exhibited the same MIC value for tetracycline (5 µg). But in case of Pseudomonas sp. MIC for tetracycline was 30 µg. E-Coli showed resistance to tetracycline in all concentrations.

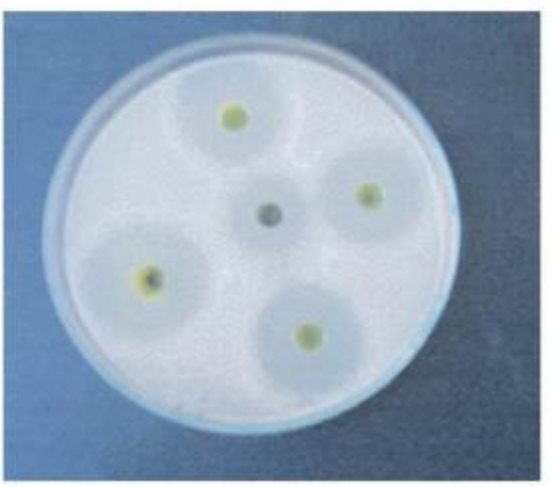
The organisms such as Klebsiella *sp.* and *Staphylococcus sp.* exhibited the similar MIC value for streptomycin (10 µg). But *E-coli* and *Pseuomonas sp.* exhibited the MIC of streptomycin as 30 µg. In case of *Proteus sp.* and *streptococcus sp.* the MIC was 50 µg and 20 µg. Respectively.

Tetracycline against Proteus sp

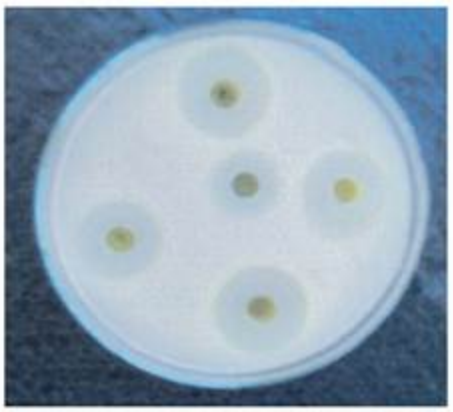
Boerhaavia diffusa against *E.coli*



Streptomycin against Pseudomonas sp



Amikacin against Proteus sp



Cephaelis ipecacuanha against *Pseudomonas sp*

Gendarussa vulgaris against *Pseudomonas sp*

Fig : 1 Showing Mic Determination Of Antibiotics Against Clinical Isolates

Table-1: Showing Mic Of Different Antibiotics Against Clinical Isolates.

CONCENTRATION IN µg				MINUMUM INHIBITORY		
ANTIBIOTICS	*E. Coli*	*Pseudomonas*	*Proteus*	*Klebsiella*	*Staphylococcus*	
Tetracycline	-	30	5	5	5	
Streptomycin	30	30	50	10	10	
Chloramphenicol	5	5	5	5	5	
Ofloxacin	5	5	5	5	5	
Pefloxacin	5	5	5	5	5	
Norfloxacin	5	5	5	5	5	-
Amikacin	10	20	10	20	30	-
Vancomycin	-	-	-	-	10	20
Co-Trimaxazole	20	-	-	--	20	20
Levofloxacin	-	-	-	-	10	10

Table-2 : Showing Mic Of Different Plants Extracts Against Clinical Isolates

PLANT EXTRACTS	MINIMUM INHIBITORY CONCENTRATION MIC IN µg					
	E. Coli	*Pseudo-monas*	*Proteus*	*Klebsiella*	*Staphylo-coccus*	*Streptococcus*
Achyranthes aspera	10	-	20	10	40	30
Adhatoda vasika	-	30	40	10	20	10
Aloe indica	-	30	20	-	10	5
Andropogon muricatus	30	10	10	5	10	5
Boerhaavia diffusa	5	10	5	10	-	10
Calotropis gigantean	5	40	10	30	-	10
Cardiospermum halicacabum	30	40	5	5	5	5
Cephalis ipecacuanha	10	10	10	10	10	5
Cocculus cordifolius	10	10	10	20	40	-
Gendarussa vulgaris	5	5	5	10	10	10

According to Hayaht Basha (2004), Aloe Vera has the antimicrobial activity against Gram positive and Gram negative bacteria. This is in agreement with current study i.e. Aloe indica showed the MIC against *Pseudomonas sp., Proteus sp., Klebsiella sp and Streptococcus sp.* Ahmed et al., (1998) and Desta (1993) reported that aqueous and alcoholic extracts from roots of Plumbagin zeylanica showed antibacterial activity against Staphylococcus sp., *Pseudomonas aeroginosa and Proteus vulgaris.* The result from the current study shows that the plants such as Boerhaavia diffusa, Cephaelis ipecacuanha and Gendarussa vulgaris showed the MIC against *Pseudomonas sp., Proteus sp and Staphylococcus sp.*

III. CONCLUSION

Antibiotics give immediate cure. But they give side effects when people use it continuously. Herbal medicines are being prepared from plant extracts. God has provided plants as gift to the people. When people use herbal medicines, they have no side effect or else they have very less percentage of side effects.

Eventhough the administration of herbal medicine isvery difficult; people get relief from the diseases also the activity will remain for long time. But the antibiotics administration is very easy. The relief is immediate and

also the activity will remain only very few days.From the results of present study it is concluded that the herbal medicine is bettern than antibiotics, because most of the naturally occurring plants are having antimicrobial activity against the pathogenics organisms like *E-coli*, this study, norfloxacin showed high activity against the organisms such as *E-coli, Pseudomonas sp, Proteus sp and Klebsiella sp.*, In case of co-trimaxazole, except E coli other organisms such as , *Pseudomonas sp., Proteus sp. and Klebsiella sp.* exhibited the higher resistant activity. According to Gupta et al., (2002) the norfloxacin was effective for treatment of urinary tract infection and also co-trimaxazole shows high degree of resistance against uropathogens. This is in agreement with findings of

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