

Antimicrobial Activity of Alkaloids Extracted from Terminalia Arjuna Against Several Microbes

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ABSTRACT

Morbidity and mortality due to multi antibiotic resistant microbial metabolites is a major concern in developing countries. The extracts obtained from T. arjuna bark was used as a biological tool in this study. This extracts inhibited the growth of microbes undertaken at all concentrations and effects of concentrations are visible on the zone of inhibition. The total activity of the extracts against each pathogen, were also evaluated. This activity of the leaf alkaloid was found to be highest against E. aerogens.

Keywords: Total activity, Anticancerous, Morbidity, Mortality, Minimum Inhibitory Concentration (MIC).

INTRODUCTION

A wide variety of medicinal vegetation used traditionally have not yet been investigated against various microbes¹. Plants remain the most common source of antimicrobial agents and is reported to have minimal side effects^{2,3}. The most important among the bioactive constituents of plants are alkaloids, tannins, flavonoids and steroids⁴. Now a days, infections have increased to a great extent and antibiotic resistance effects have become an ever increasing therapeutic problem⁵. The natural

products extracted from higher plants may possess a new source of antimicrobial agents with novel mechanism of action^{6,7}. The leaves and bark of T. arjuna contain glycosides having cardio protective effect, flavonoids having antioxidant, anti-inflammatory, antimicrobial, anticancerous and lipid lowering effects, tannins responsible for astringent wound healing, antioxidant, antiviral and antimicrobial activity also contains triterpenoids responsible mainly for cardio protective and antibacterial (arjunic acid) effects^{8,9,10}.

DETECTION OF ALKALOIDS

Each test samples was acidified by 5ml of 2% HCl at 60°C for two hours, cool and filter. If on adding 2ml of wagner reagent (1.25g I₂ and 2g of KI in 100 ml of distilled water) white precipitate is formed, indicated the presence of alkaloids.

EXTRACTION OF ALKALOIDS

A finely powered sample (150g) of the bark was extracted¹¹ with 10% acetic acid in ethanol for four hours. The extracts were concentrated and ammonium hydroxide is added into it. The precipitates were washed with 1% ammonium hydroxide, centrifuged and dried in vacuum and weighed. It is stored at 4°C in air tight vial.

SELECTION OF TEST MICROBES

The bacterial strain were growth and maintained on 'Muller-Hinton Agar Medium' (Beef extract 2.0g, Peptone 17.5g, Starch 1.5g, Agar 17.0g in 1000 ml of distilled water final pH 7.4 ± 0.2 at 37°C). Pathogenic microorganism selected for the study include four bacteria namely, E. Coli, P. aeruginosa, E. aerogens and S. aureus.

SUSCEPTIBILITY AGAINST T. ARJUNA EXTRACT

The extract of bark of Terminalia arjuna constitutes crude drug having important contains like tannine, triterpenoids, saponine, alkaloides, sterols, flavonoids, calcium salts and glycosidal substances, argunglyciside and argunine etc. It stops bleeding and pus formation¹².

Extract of Arjun bark was used as a biological tool to resolve the antibiotic resistance for E.coli, P.aeruginosa, E.aerogens and S.aureus. This extract showed effect against the isolated microbial strains at different concentrations(1mg/L, 2mg/L, 3mg/L, 4mg/L, 5mg/L). The zone diameter is given in the following table 1.

MINIMUM INHIBITORY CONCENTRATION AND TOTAL ACTIVITY

Minimum inhibitory concentration (MIC) was determined for the extracts obtained showing antimicrobial activity against test pathogens in a disc diffusion assay. The broth microdilution method was followed for determination of MIC values. MIC values are determined with each plant extract using the broth microdilution method¹³. Total activity (TA) is the volume at which the test extracts can be diluted without losing the ability to kill microorganisms. It is calculated by dividing the amount of extract from 1g of plant material by the MIC of the same extract and is expressed in ml/g¹⁴.

RESULTS AND DISCUSSION

The alkaloid content estimated in each gram of plant material was recorded in table 2. The leaves of T. arjuna were confirmed to have maximum alkaloid content (12mg/gdw) followed by fruits (7.33mg/gdw) and stem bark (3.9mg/gdw). The alkaloid extracts obtained were then screened against the test pathogens, undertaken for this study as given in fig.1. Most of the extracts showed antibacterial potential against the selected microbes. All

four isolated bacterial strain have been tested for antibiotic sensitivity against four commonly used antibiotics belonging to different groups. Out of this strains undertaken for studies two were resistant to at least 2 antibiotics. 95.00% were resistant to ampicillin, 49.50% were resistant to erythromycin. The results of the present antimicrobial resistant pattern clearly indicates that bacteria were more resistant to the antibiotics that were most frequently used and easily available. Less resistance was found to the antibiotics that were costly.

Table 1. Zone diameter at different concentration of T. arjuna extract

S.No.	Name of Microbes	No. of isolate	Zone of diameter(mm)				
			1mg/disc	2mg/disc	3mg/disc	4mg/disc	5mg/disc
1.	E. aerogens	18	-	-	-	-	12
		15	-	-	-	12	12
		14	8	8	10	12	12
2.	P. aeruginosa	39	-	13	14	15	17
		38	-	-	-	8	9
		24	10	10	14	17	17
3.	E. coli	58	-	-	8	10	11
		57	9	11	13	16	17
		56	8	10	10	14	14
4.	S. aureus	60	-	-	9	11	11
		59	10	10	12	15	16
		58	9	9	11	13	13

Table 2. T. Arjuna (alkaloid extraction)

S. No.	Part name of selected plants	(Alkaloids in mg/gdw)						Average value of alkaloids in mg/gdw
1.	Leaf	11.8	11.8	11.9	12.1	12.2	12.2	12
2.	Fruits	6.9	7.2	7.25	7.25	7.6	7.8	7.33
3.	Stem bark	3.6	3.8	3.9	3.9	4.4	4.4	3.9

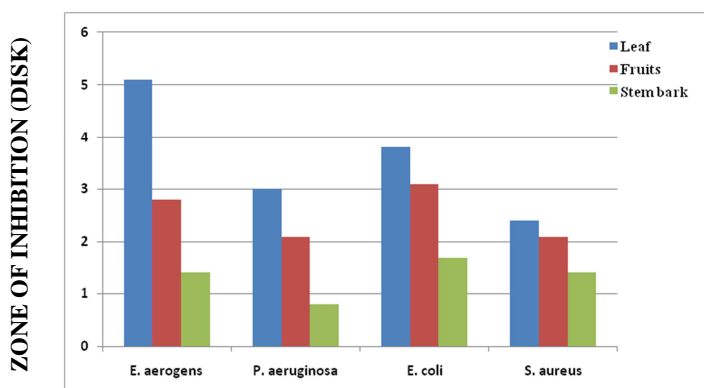


Fig.1 Plant Parts and Microbes

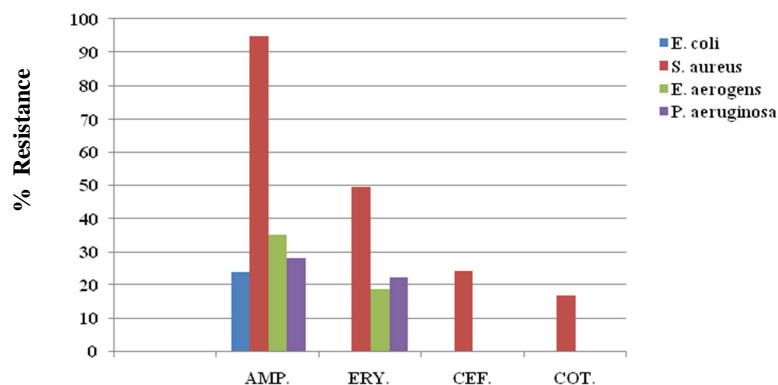


Fig.2 Antibiotics and Microbes
(AMP – Ampiciline, ERY – Erythromycine, CEF – Ceftriaxon, COT – Cotrimoxagoll)

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