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RESEARCH ARTICLE

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Anti-bacterial activity of selected medicinal plants

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ABSTRACT

The contemporary study was focused to monitor the anti-bacterial activity of certain time-honored medicinal plants in opposition to *E.coli.* For instance dried leaves of *Lagenaria siceraria, Acalypha indica, Melia dubia and the seeds of Terminalia bellerica,* and the gel of *Aloe vera* were screened for the anti-bacterial activity by Agar well diffusion method on Muller Hinton Agar. Among these a momentous result was exhibited by *Lagenaria siceraria* (25 mm). The above findings brought to light that the leaves of *Lagenaria siceraria* have power and potential activity against *E.coli.* In our upcoming research, we have decided to find the effect of combination of drugs using *Lagenaria siceraria* and check the toxicity of *Lagenaria siceraria.*

Keywords: *Anti-bacterial activity, Escherichia coli, Lagenaria siceraria, momentous.*

1. INTRODUCTION

Traditional systems of medicines have always important roles in meeting global health care needs. India has a peculiar feature of having six recognized systems of medicine: Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy. The current governing system of Modern medicine or Allopathy has slowly but surely developed and over the years come to be give a positive response through scientific research and execution. However, the fundamental basis for its development lies in traditional medicine and remedy [1]. *Lagenaria siceraria* is also called as *Lagenaria leucantha* Rusby and *Lagenaria vulgaris* Seringe. It's common names are given as follows: Bottle gourd (Eng); Alabu (Sanskrit); Lauki or Ghia (Hindi); Dudhi or Tumbadi (Gujarati); Sorakkai or Surai (Tamil); Chorakkaurdu (Malayalam) [2]. The leaves, fruits, seeds are edible and used traditionally for the remedy of jaundice, diabetes mellitus, ulcer, piles, colitis and skin disease.The fruit pulp is used as an emetic, sedative, -purgative, cooling, diuretic, and pectoral [3]. Constituents of *Lagenaria siceraria* include triterpenoids, flavonoids and steroids. Fruit is a good source of iron, calcium, phosphorus, and vitamin B. It contains 6% sugar, and the seeds contain a fixed oil and saponins. The methanol extract of surai exhibited major diuretic potential, immunomodulatory, anti-hyperlipidemia, anthelmintic [4], antioxidant [5], sedative [6], anti-microbial [7], anti-hyperglycemic [8], anti-urolithiatic [9], cardioprotective [10], hepatoprotective[11], anti-compulsive activity [12], analgesic [13], anti-mutagenic [14] and anti-cholesterol activity [15]. The major aerobic bacterial flora of the large intestine of human beings and animals is composed of non-sporing, non-acidfast, gram negative bacilli. They showed common morphological and biochemical similarities and are grouped together in the large and complex family Enterobacteriaceae. *E.coli* is the lactose-fermenting organism. The majority of commensal intestinal bacilli are lactose-fermenting (LF) [16]. In this study we measured anti-bacterial activity of *Lagenaria*

siceraria, Acalypha indica, Melia dubia, Phyllanthus emblica and the gel of *Aloe vera*.

2. MATERIALS AND METHODS

2.1. Collection of plants

Fresh leaves of distinctive plants like *Lagenaria sicereria, Acalypha indica, Melia dubia, Phyllanthus emblica* and the gel of *Aloe vera* were collected. Disease freed leaves were collected from Pudhur road, Salem (Latitude 11^0 40 25N to $11^0$40′30″N Longitude $77^0$47′20″E to $77^0$47′32″E). The leaves were washed thoroughly 6-7 times in running water and once with sterile distilled water, then it perfectly dried.

2.2. Powder and extract preparation

Thoroughly washed leaves of above mentioned plants were dried in shade for six days and then extraction was carried out at room temperature under normal condition. Dried leaves and seeds of above mentioned plants were powdered, sieved, and weighed perfectly and processed to extraction using soxhlet apparatus at room temperature using aqueous solution successively. The extracts obtained were filtered and proceed. The additional extracts were stored in air tight container.

2.3. Growth and maintenance of test microorganism

Bacterial culture of *Escherichia coli (E.coli)* was obtained from the hospital, Salem. The Bacteria was maintained on nutrient agar in refrigerator.

2.4. Preparation of media-Muller Hinton Agar (MHA)

Muller Hinton Agar is purchased on Hi-Media Pvt Ltd, Mumbai, India and prepared aseptically as per standard procedures.

2.5. Assessment of in vitro antibacterial activity

Evaluation of activity was carried out by agar (lawn and pour) method. Antibacterial activity was measured in terms of zone of inhibition (ZOI) and minimum inhibitory concentration. Agar well method (lawn method or Kirby-Bayer's method) – Preliminary antibacterial activity was studied by agar well method by slight modifications on the solidified agar. Wells of 6 mm diameter were punched with sterile borer. Bacteria's were firmly swept over the agar plate using sterile cotton swab to make uniform culture lawns. The extracts were poured in wells and incubated to 18 to 24 hours. Next day these plates were obtained for clear zone around the wells.

2.6. GC-MS analysis

The GC-MS analysis of *Lagenaria siceraria* leaf extract with in absolute aqueous solution was performed using Clarus 500 Perkin Elmer gas chromatography equipped with Capillary Column Elite-5MS (5%Phenyl 95% dimethylpolysiloxane) (Column length: 30m,Column id: 250µm) and mass detector turbomass(version 5.2.0) which was operated in Electron Ionization(70ev). Helium was used as carrier gas at a flow rate of 1 ml/min, the injector was operated at 280^0 C and the oven temperature was programmed as follows; 50ºCat 6ºC/min to 200ºC (5min)at 7ºC/min to 280ºC (5min). The mass range was 40-450amu.The transfer line and source temperature were 200ºC, 160ºC.The identification of components was based on comparison of their mass spectra with those NIST 2005 Library. The quantity of injected sample was 1.4 micro litre and the sample was soluble in ethanol. The compounds present in *Lagenaria siceraria* extract were given in the table.1.

2.7. Statistical reports

For each plant sample, the antibacterial assay was performed for three times and the inhibitory zones obtained were recorded. Using Microsoft Excel 2007 (Roselle, IL, USA), the data were processed to find mean and standard deviation.

3. RESULTS AND DISCUSSION

Plants have been the chief source of drugs for the remedies for various disease in Indian medicine and other antique systems in the world, and for a long time various disease have been treated orally with herbal medicines or their extracts. Because plant products are frequently considered to be less toxic and more free from side effects than synthetic ones. Furthermore, after the recommendations made by the WHO on, investigations on medicinal plants have become more important and the search for more effective agents has continued to be an important area of active research. In our analysis of zone formation we observed the following results – *Lagenaria siceraria* (cucurbitaceae) -25±1mm, *Acalypa indica*

Table 1. Compounds identified using GC-MS analysis

S.No.	Peak Name	Retention Time(min)	Peak Area	% Peak area
1.	Name: 1H-Pyrrole, 1-methyl- Formula: C_5H_7N MW: 81	2.94	2232664	1.2011
2.	Name: Acetamide, N-acetyl-N-methyl- Formula: $C_5H_9NO_2$ MW: 115	3.29	1545021	0.8312
3.	Name: Methyl acetoxyacetate Formula: $C_5H_8O_4$ MW: 132	3.54	3914460	2.1058
4.	Name: 2-Propanone, 1,1-diethoxy- Formula: $C_7H_{14}O_3$ MW: 146	3.77	5263673	2.8316
5.	Name: 2-Cyclopenten-1-one, 2-hydroxy- Formula: $C_5H_6O_2$ MW: 98	6.42	158552	0.0853
6.	Name: 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one Formula: $C_6H_8O_4$ MW: 144	7.17	195948	0.1054
7.	Name: 2-Hexenoic acid, (E)- Formula: $C_6H_{10}O_2$ MW: 114	8.86	480477	0.2585
8.	Name: 2,5-Dimethyl-4-hydroxy-3(2H)-furanone Formula: $C_6H_8O_3$ MW: 128	9.64	931871	0.5013
9.	Name: 2-[2-(4-Methyl-furazan-3-yloxy)-ethyl]-2H-tetrazol-5-ylamine Formula: $C_6H_9N_7O_2$ MW: 211	10.54	1935659	1.0413

10.	Name: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl- Formula: $C_6H_8O_4$ MW: 144	11.80	1860257	1.0007
11.	Name: 2-Propanamine, N-methyl-N-nitroso- Formula: $C_4H_{10}N_2O$ MW: 102	12.16	263435	0.1417
12.	Name: Benzofuran, 2,3-dihydro- Formula: C_8H_8O MW: 120	14.36	329102	0.1770
13.	Name: 2-Methoxy-4-vinylphenol Formula: $C_9H_{10}O_2$ MW: 150	15.53	571144	0.3073
14.	Name: Toluene, 4-(1,1-dimethyl-2-propynyloxy)- Formula: $C_{12}H_{14}O$ MW: 174	16.10	75234	0.0405
15.	Name: 2',6'-Dimethyl-4'-propoxyacetophenone Formula: $C_{13}H_{18}O_2$ MW: 206	16.88	88030	0.0474
16.	Name: 2-Butanone, 3-(4-tert-butylphenoxy)- Formula: $C_{14}H_{20}O_2$ MW: 220	18.72	96661	0.0520
17.	Name: (2,4,6-Trimethylcyclohexyl) methanol Formula: $C_{10}H_{20}O$ MW: 156	19.36	135523	0.0729
18.	Name: 1,3;2,5-Dimethylene-l-rhamnitol Formula: $C_8H_{14}O_5$ MW: 190	19.63	11968243	6.4384
19.	Name: 2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl- Formula: $C_{11}H_{16}O_2$ MW: 180	20.31	271741	0.1462

20.	Name: Dodecanoic acid Formula: $C_{12}H_{24}O_2$ MW: 200	20.76	1387025	0.7462
21.	Name: 4,4,5,8-Tetramethylchroman-2-ol Formula: $C_{13}H_{18}O_2$ MW: 206	22.64	854303	0.4596
22.	Name: Tetradecanoic acid Formula: $C_{14}H_{28}O_2$ MW: 228	24.46	1616996	0.8699
23.	Name: Oxazole, 5-hexyl-2,4-dimethyl- Formula: $C_{11}H_{19}NO$ MW: 181	24.90	662856	0.3566
24.	Name: 2-Hexadecene, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]- Formula: $C_{20}H_{40}$ MW: 280	25.03	1703146	0.9162
25.	Name: 3,7,11,15-Tetramethyl-2-hexadecen-1-ol Formula: $C_{20}H_{40}O$ MW: 296	25.19	21727724	11.6886
26.	Name: E,Z-2,15-Octadecadien-1-ol acetate Formula: $C_{20}H_{36}O_2$ MW: 308	25.95	6933525	3.7300
27.	Name: n-Hexadecanoic acid Formula: $C_{16}H_{32}O_2$ MW: 256	28.03	31080006	16.7198
28.	Name: Phytol Formula: $C_{20}H_{40}O$ MW: 296	30.88	55378344	29.7913
29.	Name: cis,cis,cis-7,10,13-Hexadecatrienal Formula: $C_{16}H_{26}O$ MW: 234	32.50	25759044	13.8573
30.	Name: 16-Heptadecenal	36.21	420244	0.2261

	Formula: $C_{17}H_{32}O$ MW: 252			
31.	Name: cis,cis,cis-7,10,13-Hexadecatrienal Formula: $C_{16}H_{26}O$ MW: 234	39.26	1864680	1.0031
32.	Name: 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)- Formula: $C_{30}H_{50}$ MW: 410	45.10	4182107	2.2498

(Euphorbiaceae)-17±1mm, *Melia dubia* (Meliaceae)-20±2mm, *Aleo vera* (Liliaceae), *Phyllanthus amarus* (Euphorbiaceae)-21±2mm (Fig 1). Among the above mentioned plants Surai has high influence to inhibit the *E.coli* (25±1mm) significantly. In GC-MS analysis, we observed the following compounds, mostly wider used compounds include phytol (29.7913%), hexadecanoic acid (16.7198%) as shown in Fig 2 and Table 1. In our research aspect it may cure diarrhea, septicemia and urinary tract infection.Medicinal plants are the indigenous heritage with the universal significance. The current study reveals that surai could be used as medicine for treating diarrhea, urinary tract infection and pyogenic lesions (septicemia).

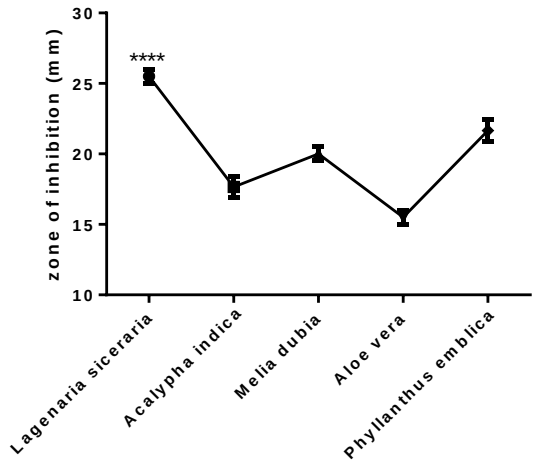
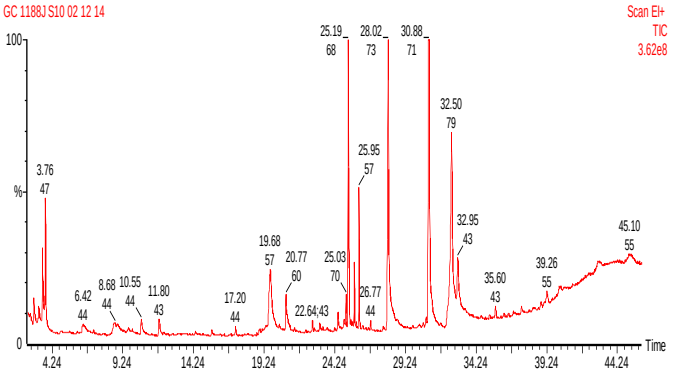


Figure 1. Zone of inhibition as observed for different plants

Figure 2. Chromatogram GC-MS analysis



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Conflict of Interest

The authors declare that they have no conflicts of interest.

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