



## **Evaluation of antibacterial activity of *Cinnamomum zeylanicum* and *Eclipta alba* (L) Hassk. on UTI pathogens.**

**Sudha, R.**

PG and Research Department of Zoology, Nehru Memorial College (Autonomous),  
(Accredited with "A" Grade by NAAC) Puthanampatti-621 007, Tiruchirappalli District, Tamil Nadu, India.

\*Corresponding Author: [sudha28021984@gmail.com](mailto:sudha28021984@gmail.com)

### **Abstract**

This study was investigate to asses the Antibacterial Activity of *Cinnamomum zeylanicum* and *Eclipta alba* (L) Hassk. Used against UTI Causing Pathogens. Bacteria were isolated from the urine sample of UTI infected patients and characterized by biochemical methods. Chloroform and acetone extracts were prepared from test plant materials and the zones of inhibition were compared with the zone of inhibition of standard antibiotics. Results from the present study showed that *Cinnamomum zeylanicum* had more antibacterial activity compared to *Eclipta alba* (L) Hassk. and *Cinnamomum zeylanicum* was effective as commercially used antibiotics.

**Keywords:** *Cinnamomum zeylanicum*, *Eclipta alba* (L) Hassk, Antibacterial, UTI.

### **1. Introduction**

A urinary tract infection (UTI) is an infection that initiate in the urinary system. The urinary tract consists of the kidneys, ureters, bladder and the urethra (Geetha *et al.*, 2011). *E. coli* which is the most frequently infecting organisms causing 95% of UTI [Kebira *et al.*, 2009]. However, many other bacteria can cause UTI for example *Klebsiella*, *Pseudomonas*, *Enterobacter*, *Proteus*, *Staphylococcus*, *Mycoplasma*, *Chlamydia*, *Serratia* and *Neisseria spp.* Different age group of people can affect by UTI. Sometimes, the UTI is symptomatic or asymptomatic and complicated or uncomplicated in nature. It is reported that female are more likely to get UTI and about 35% of healthy female suffer symptoms of Urinary tract infection and about 5% of female each year suffer with the problem of dysuria (painful urination) and frequency (Hootan, 2003). Due to increasing antibiotic resistance among bacteria has made therapy of UTI difficult.

Herbs and spices have been used since ancient times in the treatment of UTI, because of their antimicrobial properties. Cinnamon is one of the spices used to treat UTI and also act as a health-promoting agent for the treatment of diseases such as inflammation, gastrointestinal disorders (Brierley and Kelber, 2011 and Al-Jiffri *et al.*, 2011), anti-oxidant (Hoque *et al.*, 2008 and Asimi *et al.*, 2013), antimicrobial (Nabavi *et al.*, 2015 and Marchese *et al.*, 2014), anti-diabetic and anti-tumor. Cinnamon is the bark of the evergreen tropical cinnamon tree. It may be in the form of quill or ground powder. So it not only adds aroma and taste to your food but also has profound health benefits. *Cinnamomum*, commonly used as spices, contain many antibacterial compounds and the term cinnamon commonly refers to the dried bark of *C. zeylanicum* and *C. aromaticum* (Jakhelia *et al.*, 2010). *C. zeylanicum* could be considered a more valuable in the treatment of infection and mainly against MRSA bacteria (Mandal, *et al.*, 2011).

*Eclipta alba* is commonly known as Bhringaraja belonging to the family Asteraceae/Compositae which is small branched annual herbaceous plant with a long history of traditional medicines used as antimytotoxic, analgesic, antibacterial, antihepatotoxic, antihemorrhagic, antihyperglycemic, antioxidant, immunomodulatory properties (Manoj Kumar Pandey *et al.*, 2011) and also used in catarrhal jaundice and for skin diseases (Dalal *et al.*, 2010). Chemical constituents of *Eclipta alba* (L.) Hassk are ecliptal, ecliptine, ecliptalbine, -terthienylmethanol, -amyrin and sigmasterol (Prasad *et al.*, 2012). In this present study, the antimicrobial effect of the chloroform and acetone extracts of *C. zeylanicum* and *Eclipta alba* were tested against UTI causing pathogens *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* and *Staphylococcus aureus*. To evaluate the antibacterial activity of *C. zeylanicum* and *Eclipta alba* (L.) Hassk extracts in comparison with a known drug of antibacterial activity such as a few antibiotics.

## 2. Materials and Methods

### 2.1 Isolation of test pathogens:

Test pathogens were isolated from urine samples of UTI infected patients and were cultured in the nutrient broth.

### 2.2 Identification of test pathogens:

Gram staining procedure was adopted to differentiate between Gram positive and Gram negative organisms. Selective agar medium was used for further identification as follows:

Mac Conkey's Agar	: <i>E. coli</i>
PABM	: <i>Pseudomonas aeruginosa</i>
EMB Agar	: <i>Klebsiella pneumoniae</i>
MSA	: <i>Staphylococcus aureus</i>

Identification was carried out based on the biochemical reactions. Nine biochemical tests were performed for each organism. They were Motility, Indole production test, MR (Methyl Red), VP (Vogus-Proskauer) test, Citrate utilization test, Catalase test, TSI (triple sugar iron) agar test, Urease activity test and Hydrogen Sulphide Production.

### 2.3 Chloroform and acetone extraction:

125 gms of bark of *C. zeylanicum* and areal part *Eclipta alba* were taken in separate containers and add 250 ml chloroform and acetone in individual containers. Extracts were prepared using Soxhlet apparatus (Tanira, *et al.*, 1994). The extract collected was concentrated by exposing them in a laminar air flow and stored 4°C until further use (Caceres *et al.*, 1995). These extracts were further used to study the antibacterial activity against the urinary tract pathogens.

## 2.4 Concentration of antibiotics discs

Amikacin - 10 mcg/disc  
Ciprofloxacin - 5 mcg/disc  
Norfloxacin -10 mcg/disc  
Gentamycin- 5 mcg/disc

## 2.5 Antibacterial assay:

Petri plates containing 20 ml of Nutrient Agar medium were seeded with a 24 hrs old culture of the bacterial strains. The extracts were dissolved in Di Methyl Sulfoxide (DMSO) as 100 µg of extract with 100 µl DMSO (100%). 25µl, 50 µl, 75 µl and 100 µl concentrations of bark extracts were impregnated into sterile 6mm diameter discs. Discs are dried and dispensed on the solidified Nutrient Agar, inoculated with test pathogens. Incubation was made at 37°C for 24hrs. The assessment of antibacterial activity was based on the measurement of diameter of the inhibition zone formed around the discs (Hudzicki, 2009). Inhibition zones with diameter less than 12 mm were considered as non antibacterial activity, diameters between 12 and 16 mm considered as moderately active and these with more than 16mm were considered as highly active (Indu, *et al.*, 2006).

## 3. Results and Discussion

UTIs are considered as the most severe health problems facing the world. The present study has exposed the importance of natural herbs to control antibiotic resistant in bacteria which are being a threat to human health. Colony morphology were studied on nutrient agar medium and then on the selective media. Based on biochemical analysis, four different bacteria *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* and *Staphylococcus aureus* were isolated from urine of UTI infected patients. The results of final identification on the basis of biochemical analysis were shown in the Table 1. The Antibiotic sensitivity pattern of test pathogens showed several susceptible and resistant (Table 2). Antibacterial activity of *C. zeylanicum* and *Eclipta alba* on test pathogens was given in Table 3 and Table 4 respectively. In both *C. zeylanicum* and *Eclipta alba* no results were found in 25 µl concentration on both extracts except chloroform extract of *C. zeylanicum* on *Klebsiella pneumonia* and maximum size of zone of inhibition were observed in 100 µl concentrations. The zone of inhibition increased with increased concentration in both test plant materials. Cinnamon exhibited antibacterial activity against all the test pathogens. These results were in agreement with the findings of Anandharaj and Saju Varghese, 2015 and Jyothi Prabha and Venkatachalam, 2015. To all the four test pathogens, *C. zeylanicum* had highest activity than *Eclipta alba*. According to Manoj Kumar Pandey *et al.*, 2011 hexane extract of showed *Eclipta alba* high antibacterial activity against *S.aureus*, *B.cereus*, *E.coli*, *S.typhi*, *K.pneumoniae*, *S.pyogenes* and *P.aeruginosa*.

whereas acetone, ethanol, methanol and aqueous extracts showed intermediate activity against *S.aureus*, *B.cereus*, *E.coli*, *S.typhi*, *K.pneumoniae*, *P.aeruginosa*, *P.mirabilis* and *S.pyogenes*. Similar studies (Uddin *et al.*, 2010, Chitravadivu *et al.*, 2009) elsewhere also recorded that the ethanol aerial parts extract of *Eclipta alba* revealed high antibacterial activity for *S.aureus*, *E.coli*. Figure 1 to 4 showed the comparison of antibacterial activity of *C. zeylanicum* and *Eclipta alba* against *E.coil*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* and *Staphylococcus*

*aureus* with zone of inhibition of standard antibiotic respectively. The results of the present study showed that the selected plants *C. zeylanicum* and *Eclipta alba* extracts was effective against the test bacteria. The results of the present study also support the medicinal value and usage of the studied spice and herb extracts can be used as antimicrobial agents and *C. zeylanicum* showed more or less equal zone of inhibition when compared with commercially used drugs to treat UTIs caused by these test pathogens.

Table 1: Biochemical reactions.

Tests	Organism confirmed			
	<i>E. coli</i>	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella pneumoniae</i>	<i>Staphylococcus aureus</i>
Motility	+	+	-	+
Indole	+	-	-	-
MR	+	-	-	+
VP	-	-	+	+
Citrate	-	+	+	-
Catalase	+	+	+	+
TSI	+	+	+	+
Urease	-	+	+	-
Hydrogen Sulphide Production	-	-	-	+
Gram staining	-	-	-	+

Table 2: Antibiotic sensitivity pattern of urinary tract pathogens.

Name of test pathogens	Antibiotics (Zone of inhibition in mm)
<i>E. coli</i>	Norfloxacin 22
<i>Pseudomonas aeruginosa</i>	Ciprofloxacin 25
<i>Klebsiella pneumoniae</i>	Amikacin 20
<i>Staphylococcus aureus</i>	Gentamycin 19

Table 3: The *C. zeylanicum* sensitivity pattern of urinary pathogens

Name of Extracts	Pathogens	Zone of inhibition (mm)			
		Concentration (µl)			
		25	50	75	100
Chloroform	<i>E. coli</i>	-	12	15	20
	<i>Pseudomonas aeruginosa</i>	-	12	16	23
	<i>Klebsiella pneumoniae</i>	12	15	16	16
	<i>Staphylococcus aureus</i>	-	12	17	26
Acetone	<i>E. coli</i>	-	-	17	21
	<i>Pseudomonas aeruginosa</i>	-	12	12	20
	<i>Klebsiella pneumoniae</i>	-	16	16	16
	<i>Staphylococcus aureus</i>	-	-	-	18

Table 4: The *Eclipta alba* sensitivity pattern of urinary pathogens.

Name of Extracts	Pathogens	Zone of inhibition (mm)			
		Concentration (µl)			
		25	50	75	100
Chloroform	<i>E. coli</i>	-	-	-	12
	<i>Pseudomonas aeruginosa</i>	-	13	14	14
	<i>Klebsiella pneumoniae</i>	-	12	17	17
	<i>Staphylococcus aureus</i>	-	12	12	14
Acetone	<i>E. coli</i>	-	-	12	12
	<i>Pseudomonas aeruginosa</i>	-	12	14	14
	<i>Klebsiella pneumoniae</i>	-	-	-	12
	<i>Staphylococcus aureus</i>	-	-	12	12

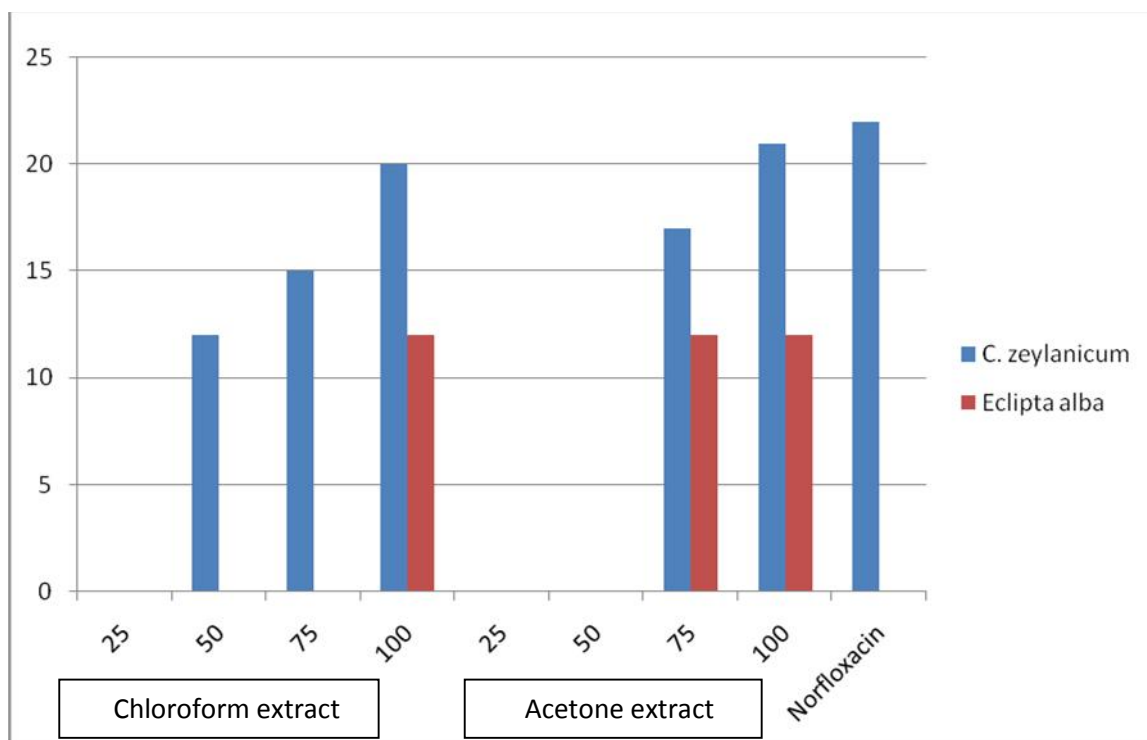


Fig. 1: Antibacterial activity of *C. zeylanicum* and *Eclipta alba* against *E. coli*.

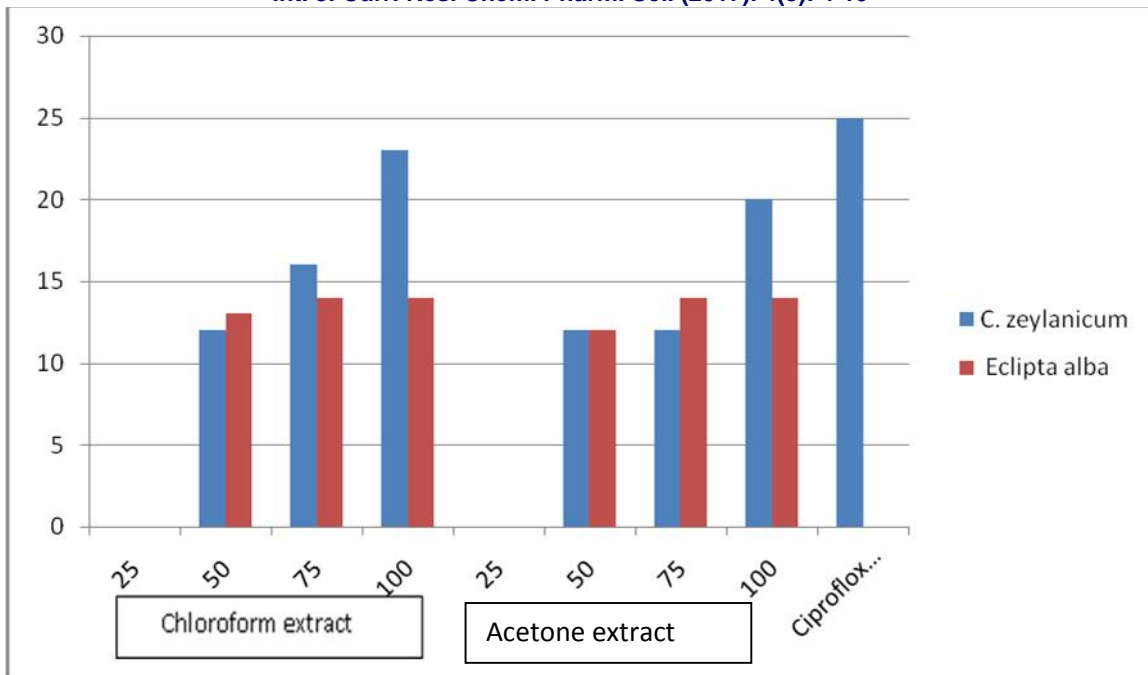


Fig. 2: Antibacterial activity of *C. zeylanicum* and *Eclipta alba* against *Pseudomonas aeruginosa*.

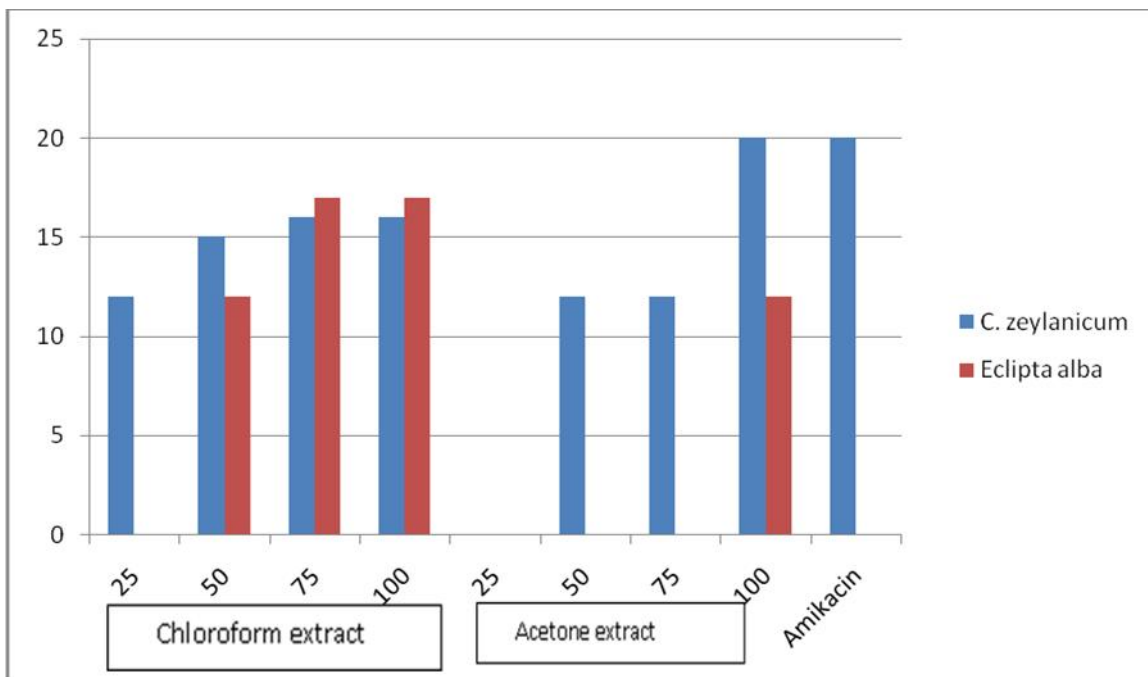


Fig. 3: Antibacterial activity of *C. zeylanicum* and *Eclipta alba* against *Klebsiella pneumoniae*.

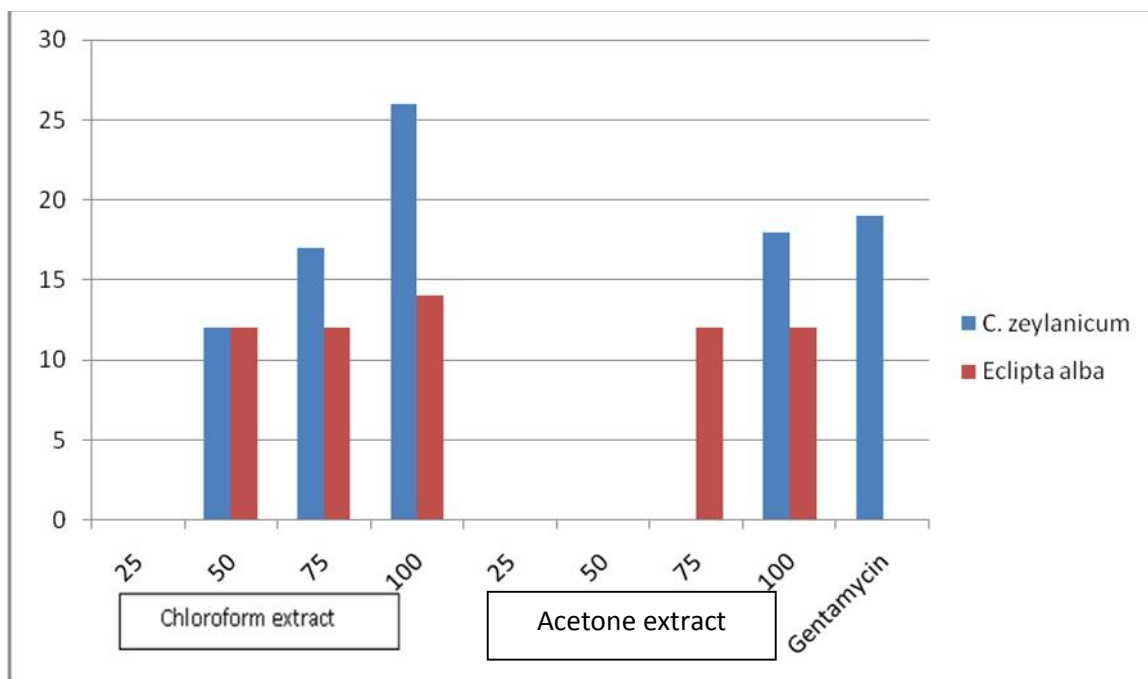


Fig. 4: Antibacterial activity of *C. zeylanicum* and *Eclipta alba* against *Staphylococcus aureus*

## References

- Al-Jiffri, O, El-Sayed, Z and Al-Sharif, F. 2011. Urinary tract infection with *Escherichia coli* and antibacterial activity of some plants extracts. *Int. J. Microbiol. Res.*, 2, 1–7.
- Anandharaj and Saju Varghese. 2015. Efficacy of Spice Extracts against UTI Isolates. *Int. J. Curr. Microbiol. App. Sci.* 4(6): 494-500
- Asimi, O.A, Sahu, N.P and Pal, A.K. 2013. Antioxidant activity and antimicrobial property of some Indian spices. *Int J Scientific and Research Publications.* Mar;541.
- Brierley, S.M and Kelber, O. 2011. Use of natural products in gastrointestinal therapies. *Curr. Opin. Pharmacol.* 11, 604–611.
- Caceres, A., Menendez, M., Menendez, E., Cohobon, E., Samayoa, E., Jauregui, E., Perlata, E. and Carrillo, G. 1995. Antigonorrhoeal activity of plants used in Guatemala for the treatment of sexually transmitted diseases, *Journal of Ethnopharmacology.* 48:85-88.
- Chitravadvu, C., Manian, S and Kalaichelvi, K. 2009. Antimicrobial Studies on Selected Medicinal Plants, Erode Region, Tamilnadu, India. *Middle-East J. of Sci. Res.*;4(3):147-152.
- Dalal, S., Kataria, S.K., Sastry, K and Rana, S.V.S. 2010. Phytochemical Screening of Methanolic Extract and Antibacterial Activity of Active Principles of Hepatoprotective Herb *Eclipta alba*. *Ethnobotanical Leaflets.* 14: 248-58.
- Geetha, R.V., Anitha Roy and Lakshmi, T. 2011. Nature's Weapon against Urinary Tract Infections. *Int. J. Drug Dev. & Res.* 3(3), 85-100.
- Hootan, T.M. 2003. Urinary tract infection in adults, In: Johnson R.J., Feehally J, (Eds). *Comprehensive clinical nephrology*, 2nd ed, London: Mosby. 731-744.
- Hoque, M.M., Inatsu, M.B, Juneja, V and Kawamoto, S. 2008. Antimicrobial activity of cloves and cinnamon extracts against food borne pathogens and spoilage bacteria and inactivation of *Listeria monocytogenes* in ground chicken meat with their essential oils. *Rep. Natl. Food Res. Inst.* 72:9-21
- Hudzicki, J. 2009. Kirby - Bauer Disk Diffusion Susceptibility Test Protocol. ASM Microbe Library. American Society for Microbiology.
- Indu, M.N., Hatha, A.A.M., Abirosh, C., Harsha, U and Vivekanandan, G. 2006. Antimicrobial activity of some of the south Indian spices against serotypes of *Escherichia coli*, *Listeria monocytogenes* and *Aeromonas hydrophila*, *Braz. J. Microbiol.* 37: 153-158.
- Jakhetia, V., Patel, R.; Khatri, P., Pahuja, N., Garg, S., Pandey, A and Sharma, S. 2010. Cinnamon: A pharmacological review. *JASR*; 1, 19–23.
- Jyothiprabha, V and Venkatachalam, P. 2015. Antibacterial activity of spices against multi drug resistant Bacteria isolated from urinary tract infection. *Int J Pharm Bio Sci*; Oct; 6(4): (B) 426 – 431

15. Kebira, A.N., Ochola, P and Khamadi, S.A. 2009. Isolation and antimicrobial susceptibility testing of *Escherichia coli* causing urinary tract infections. *J. Appl. Biosci*; 1320-1325.
16. Mandal, S., DebMandal, M., Saha, K and Pal, N.K. 2011. In vitro Antibacterial Activity of three Indian Spices against Methicillin-Resistant *Staphylococcus aureus*. *Oman Med. J*; 26, 319–323.
17. Manoj Kumar Pandey, Singh, G.N., Rajeev Kr Sharma and Sneha Lata. 2011. Antibacterial activity of *Eclipta alba* (L.) Hassk. *Journal of Applied Pharmaceutical Science* 01 (07); 2011: 104-107.
18. Marchese, A., Coppo, E., Sobolev, A.P., Rossi, D., Mannina, L and Daglia, M. 2014. Influence of in vitro simulated gastroduodenal digestion on the antibacterial activity, metabolic profiling and polyphenols content of green tea (*Camellia sinensis*). *Food Res. Int.* 63, 182–191.
19. Nabavi, S.M., Marchese, A., Izadi, M., Curti, V., Daglia, M and Nabavi, S.F. 2015. Plants belonging to the genus *Thymus* as antibacterial agents: From farm to pharmacy. *Food Chem.* 173, 339–347.
20. Prasad, K.V., Kavita, Y.N., Vidya, N.S., Sumeet, B.K and Manohar, P.J. 2012. *Eclipta alba*: A Phytopharmacognostic Study. *J.Pharm. Phytopharmacol. Res*; 1 (6): 350-353
21. Tanira, M.O.M., Bashir, A.K. and Banna, N.R., 1994. Antimicrobial and phytochemical screening of Medicinal plants of the united Arab Emirates, *Journal of ethno pharmacology* ; 41: 201-205.
22. Tanira, M.O.M., Bashir, A.K., Dib, R., Goodwin, C.S., Wasfi, L.A. and Banna, N.R. 1994. Antimicrobial and phytochemical screening of medicinal plants of the United Arab Emirates. *Journal of Ethnopharmacology* 41: 201-205.
23. Uddin, N., Rahaman., A., Ahemed, N.U, Rana, S and Akter, R. 2010. Antioxidant, Cytotoxicity and Antimicrobial properties of *Eclipta alba* ethanol extract. *Int.J.of Bio.& Med. Res*;1(4):341-346.

Access this Article in Online	
	Website: <a href="http://www.ijcrops.com">www.ijcrops.com</a>
	Subject: <a href="#">Medicinal Plants</a>
Quick Response Code	
DOI: <a href="https://doi.org/10.22192/ijcrops.2017.04.08.002">10.22192/ijcrops.2017.04.08.002</a>	

How to cite this article:

Sudha, R. (2017). Evaluation of antibacterial activity of *Cinnamomum zeylanicum* and *Eclipta alba* (L) Hassk. on UTI pathogens. *Int. J. Curr. Res. Chem. Pharm. Sci.* 4(8): 4-10.  
DOI: <http://dx.doi.org/10.22192/ijcrops.2017.04.08.002>