Jagannath University Journal of Life and Earth Sciences, **5**(2): 220-223, 2019 ISSN 2414-1402

- Short Communication

ANTIBACTERIAL ACTIVITY OF ETHANOLIC EXTRACT OF *COMMELINA BENGHALENSIS* L. LEAF

Asma Jerin[1], Bidduth Kumar Sarkar[1], Tanjila Jaman Monia[1], Balayatun Nessa[1], Juwel Rana[2] and Subrato Kumar Barman[1*],

Abstract

This research study was designed for evaluation of antibacterial activity of ethanolic extract of *Commelina benghalensis*L. leaves (ECB) against Gram-positive (*Staphylococcus aureus*) and gram-negative (*Escherichia coli*) bacteria. Here, the dried ground leaves of *C. benghalensis* L. were extracted with cold ethanol and then was evaluated for the inhibitory activity (500 µg/disc) against *S. aureus*and *E. coli* through disk diffusion method using kanamycin (30 µg/disc) as standard. ECB showed potential antibacterial activity against *S. aureus*and no inhibitory activity against *E. coli*. To validate confirmation of found antibacterial activity isolation of bioactive principle(s) and further study need to be performed.

Key words: *Antibiotic resistance, Commelina benghalensis L., Ethanolic extract, Disk diffusion, Staphylococcus aureus, Escherichia coli*

One of the greatest threats to global health in recent years has been antibiotic resistance. This happens when microorganisms alter the way drugs are used to cure infections. Misuse & overuse of antibiotics is driving the process of bacterial resistance (WHO, 2020).A resistant infection can kill people and cause immense costs on individuals as well as society (WHO, 2018a). In recent years, both an increase in antibiotic resistance and a fall in the pace of new antibiotic development have been noted. In 2018, the new Global Antimicrobial Surveillance System (GLASS) of the World Health Organization identified that *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Salmonella* spp. were the most frequently reported resistant bacteria (WHO, 2018b). Antibiotic resistance presents a major challenge worldwide in terms of mortality and financial stress (Ahmed *et al.*, 2019). Therefore, the search for source of new therapeutic agents to combat global microbial resistance has become an area of active research. *E. coli* and *S. aureus*aretwo most common pathogens in human (Chambers and Deleo, 2010 and Rasheed *et al.*, 2014). Antibiotic resistance ratesof*E. coli*specially to fluoroquinolones, third and fourth generation cephalosporin's is rapidly rising (Collignon, 2009). Resistance by *S. aureus* to methicillins, vancomycin, clindamycin, trimethoprim and sulfamethoxazole is increasing at a rapid rate in recent

[1]Department of Pharmacy, Ranada Prasad Shaha University, Narayanganj-1400, Bangladesh
[2]Department of Nutrition & Food Engineering, Daffodil International University, Dhaka-1207, Bangladesh
[*] Corresponding Author: Subrato Kumar Barman, Email-pharma.subrato@gmail.com

years (Boswihi and Udo, 2018; Ramakrishnan and Salinas, 2007; Vicetti *et al.*, 2019). Thus, management of infectious disease caused by multidrug-resistant*E. coli* and *S. aureus*has become a big challenge.

Almost 80 percent of the world's population depend on traditional medicine for primary health care, according to the WHO. About 25 percent of the world's prescription medications come from plants (Rates, 2001). *C. benghalensis* L. (Commelinaceae) is native to tropical Asia and Africa as a perennial herb. It is used in traditional medicine system to treat various ailments like epilepsy, psychosis, headache, fever, constipation, leprosy, cataracts, conjunctivitis, acne, scabies, jaundice, eczema, warts, snake bite, and infertility in women (Ghosh *et al.*, 2019 and Hossain *et al.*, 2014).

Ethanolic root extract of *C. benghalensis L.* showed anti-inflammatory and analgesic activity (Hossain et al., 2014). Methanolic, ethanolic, petroleum etheric, diethyl etheric, and aqueous extract of whole plant possessantimicrobial activity (Armando and Dennis, 2010; Khan *et al.*, 2011). Aqueous, methanol, chloroform and hexane extract of leaf showed antimicrobial activity (Sharma and Sharma, 2010). Sumithra and Purushothaman (2017) performed antibacterial assay of ethanolic leaf extract following agar well diffusion method using no standard antibiotic for comparison purpose.

Thus, this research study was aimed at evaluation of antibacterial activity of ethanolic extract of only leaf of *C. benghalensis*L. following disc diffusion method against*E. coli* and *S. aureus*. Kanamycin, a broad spectrum antibiotic (Quinn *et al.*, 2013), was used as standard drug to get comparable antibacterial activity of ECB.

Leaves of *Commelinabenghalensis*L. were collected from Ranada Prasad Shaha University campus, Shitalakhya, Naryanganj on August, 2019 and then was identified & authenticated by Bangladesh National Herbarium (BNH). A voucher specimen was submitted to BNH for further reference. The accession number given by BNH is DACB-48434.

Whole plants were collected and dedusted. Leaves were collected from the whole plant. Leaves were shade dried & ground to make coarse powders. At room temperature, approximately 150 g of crushed powder was soaked in 1000 ml of ethanol for ten days. The filtrate was evaporated to get crude ethanolic extract following vacuum filtration. Percentage (%) of yield was 12.67%. Yield calculation was done as following:

$$Percentage(\%)ofyield = \frac{Finalmassofcrudeextract}{Initialmassofsample} \times 100\%$$

Antibacterial assay was performed by disk diffusion method (Bauer *et al.*, 1966). A few colonies (3 to 10) of the organism to be investigated were moved from an initial culture plate with a wire loop into a test tube containing 4 ml of tryptose phosphate or soy broth trypticase. To create a bacterial suspension of mild cloudiness, these tubes were then incubated for 2 to 5 hours (Bauer *et al.*, 1966). With distilled water, the suspension was

then diluted to a density visually equivalent to that of a standard which was prepared by adding 0.5 ml of 1 percent $BaCl_2$ to 99.5 ml. of 1 percent H_2SO_4 (0.36 N). Large (15 cm) petri dishes with Mueller-Hinton agar were used for the sensitivity plate (5 to 6 mm in depth). The plates were dried for approximately 30 minutes prior to inoculation. With a cotton swab, the bacterial broth suspension was uniformly streaked on the surface of the medium in 3 planes. The swab was rotated against the side of the tube prior to inoculation to get rid of the excess suspension. Standard kanamycin (30 µg/disk) disk, blank disk containing only solvent and test sample disk (ECB 500 µg/disk) were prepared. After drying the inoculum (3 to 5 minutes), the disks were placed with flamed forceps on the agar and pushed down gently to ensure contact. Plates were incubated within 30 minutes. The inhibition zone was assessed after overnight incubation with a slide calipers near the surface of the agar. The zone of inhibition (mm) against investigated microorganisms is shown in table 1.

Table 1: Antibacterial activity (zone of inhibition, mm) of ECB.

Test bacteria	Zone of inhibition (mm)	
	ECB (500 µg/disk)	Kanamycin (30 µg/disk)
Staphylococcus aureus	10	32
Escherichia coli	0	30

No inhibitory activity had been observed against *E. coli* by ECB at 500µg/disk. ECB showed potential inhibition against *S.aureus* with zone of inhibition 10 mm at 500 µg/disk while standard Kanamycin inhibited a zone of 32 mm at 30 µg/disk. This activity could be potential for fighting antibiotic resistance. However, extensive research studies with various concentrations of ECB involving multiple strains & multiple antibiotics need to be performed.

Acknowledgements

The authors are grateful for the provision of needed research facilities by the Department of Pharmacy, Ranada Prasad Shaha University, and the Bangladesh Council of Science and Industrial Research (BCSIR) for providing proper analytical assistance.

References

Ahmed, I., Rabbi, M.B. and Sultana, S. (2019). Antibiotic resistance in Bangladesh: A systematic review. *International Journal of Infectious Diseases*, 80: 54–61.

Armando, C.C. and Dennis, O.O. (2010). Preliminary Phytochemical and Antimicrobial Evaluation of the Fresh and Dried Whole Plant Extracts from *Commelina benghalensis*. *Revista Colombiana de Ciência Animal*, 2(1): 104–116.

Bauer, A.W., Kirby, W.M.M., Sherris, J.C. and Turck, M. (1966). Antibiotic Susceptibility Testing By A Standardized Single Disk Method. *The American Journal Of Clinical Pathology*,45(4): 493–496.

Boswihi, S.S. and Udo, E.E. (2018). Methicillin-resistant *Staphylococcus aureus* : An

update on the epidemiology, treatment options and infection control. *Current Medicine Research and Practice*, 8(1): 18–24.

Chambers, H. F. and Deleo, F. R. (2010). Waves of Resistance: Staphylococcus in the Antibiotic Era. *Nature Reviews Microbiology*, *7*(9): 629–641.

Collignon, P. (2009). Resistant *Escherichia coli*-We are what we eat. *Clinical Infectious Diseases*, 49(2): 202–204.

Ghosh, P., Dutta, A., Biswas, M., Biswas, S., Hazra, L., Kumar Nag, Sil and Sirshendu C. (2019). Phytomorphological, chemical and pharmacological discussions about *Commelina benghalensis* Linn. (Commelinaceae): A review. *The Pharma Innovation Journal*, 8(6): 12–18.

Hossain, F., Saha, S., Islam, M., Nasrin, S. and Adhikari, S. (2014). Analgesic and anti-inflammatory activity of *Commelina benghalensis* linn. *Turkish Journal of Pharmaceutical Sciences*, 11(1): 25–32.

Khan, A.A., Islam, M.T., Rahman, A. and Ahsan, Q. (2011). Antibacterial activity of different fractions of *Commelina benghalensis* L. *Pelagia Research Library*, *2*(2): 320–326.

Quinn, G.A., Maloy, A.P., Banat, M.M. and Banat, I.M. (2013). A comparison of effects of broad-spectrum antibiotics and biosurfactants on established bacterial biofilms. *Current Microbiology*, 67(5): 614–623.

Ramakrishnan, K. and Salinas, R. C. (2007). Peptic ulcer disease. *American Academy of Family Physicians*, 76(7): 1005–1012.

Rasheed, M.U., Thajuddin, N., Ahamed, P., Teklemariam, Z. and Jamil, K. (2014). antimicrobial drug resistance in strains of *Escherichia coli*isolated from food sources. *Revista Do Instituto de Medicina Tropical de Sao Paulo*, 56(4): 341–346.

Rates, S.M.K. (2001). Plants as source of drugs. *Toxicon*, 39(5): 603–613.

Sharma, M. C., and Sharma, S. (2010). Preliminary Phytochemical and Antimicrobial Investigations of the Aqueous Extract of *Ixora coccinea* Linn and *Commelina benghalensis* L. on Gram-Positive and Gram-Negative Microorganisms. *Middle-East Journal of Scientifc Research*, 6(5): 436–439.

Vicetti Miguel, C.P., Mejias, A., Leber, A. and Sanchez, P.J. (2019). A decade of antimicrobial resistance in *Staphylococcus aureus*: A single center experience. *PLoS ONE*, 14(2): 1–12.

World Health Organization. (2018a). Antimicrobial resistance. Retrieved from https://www.who.int/topics/antimicrobial_resistance/en/

World Health Organization. (2018b). High levels of antibiotic resistance found worldwide, new data shows. Retrieved fromhttps://www.who.int/mediacentre/news/releases/2018/antibiotic-resistance-found/en/?fbclid=IwAR0mJbyg_b_PH7RGAJyqo_khGEo2jgoUBe-S6nwhQ4P0ag3-iH5_lKye1Pw

World Health Organization. (2020). Antimicrobial resistance. Retrieved from https://www.who.int/en/news-room/fact-sheets/detail/antimicrobial-resistance