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# *In vitro* antimicrobial potentials of *Senna alata* leaves against human pathogenic microbes

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**Abstract**
The research aimed to know the anti-microbial activity of the methanolic extract of *Senna alata* leaves. A disk diffusion method was used to estimate the antimicrobial activity of *Senna alata* leaves extract to *Escherichia coli, Streptococci pyogenes,* and *Proteus mirabilis* by demonstrating a Zone of inhibition. The extract of *Senna alata* leaves containing paper disk inhibited the growth of pathogenic bacteria. Paper disks containing 25, 50, 75, and 100 µg showed 10, 15, 20, and 28 mm zone of inhibition against *E. coli*. Resistance, 9, 14, and 19 mm zone of inhibition against *S. aureus*. 08, 11.5, 15, and 21 mm zone of inhibition against *Klebsiella pneumiae.* Resistance, 8, 5, 10, and 16 mm zone of inhibition against *Pseudomonus aeroginos* and Resistance, 12 and 16 mm zone of inhibition against *Pseudomonus.* It concluded that proper and systemic study of *Senna alata* may become the raw material of natural origin for antimicrobial drug production.

**Keywords:** Antimicrobial, *Senna alata* leaves, zone of inhibition

## Introduction
Medicinal plants contain a variety of bioactive compounds essential for the management of diseases that are a burden on human health. In recent times, medicinal raw materials like plants, herbs, shrubs, etc. have taken back wide acceptance due to a going up faith in traditional medicine in view of its little bit of adverse results contrasted to conventional medicine, besides, the requisite of meeting the necessary of medications for an over surging human population. Gnanamani *et al*., stated that medicinal plants were estimated for their germicide potentiality against *Staphylococcus aureus* and *Pseudomonas aeruginosa* which are the most ordinary microorganisms producing fatal infections [1]. Seedi *et al*., to distinguish from Ram *et al*., said that *Escherichia coli* is an opportunistic microbe at the site of the pierce injury [2, 3]. *S. aureus* and *P. aeruginosa* are the most frequent infectious bacterium which infects the outer surface of the body. Gnan *et al*., to distinguish from Baie *et al*., conducted that *S. aureus* shows covering proteins that develop an attachment to host proteins that make a portion of the interstitial matrix on epithelial and endothelial cell coverings as well as being a constituent of body fluids [4, 5]. Nathan said that of the two million healthcare-associated infections every year, 10% are due to *P. aeruginosa* [6]. Abdul R Ahameethunisa and Waheeta Hopper stated that globally as well as in economically growing areas, the most common human demise is the result of infectious-related bacterial disease conditions [7]. Veeresham quoted that traditionally using medicinal herbs with massive biological implementations has been contemplated as the fundamental resource of health-giving materials which could focus on the qualities of curative compounds [8]. The study of these compounds from therapeutic materials is commonly close to the separation of basic compounds and, finally, drug preparation. Diverse therapeutic medicinal herbs with multidirectional interesting pharmacophores have been accurately experimented with, and one of these plants is *Senna alata*.

Oyedele *et al*., stated that *Senna alata* (Linn.) Roxb is an attractive undergrowth shrubbery inhabitant of the Fabaceae family [9]. It is growing up in a good manner in the intertropical region. The leaves are delineated to be beneficial in medicating seizures; Cupid disease, cardiac attack or problems, gastrointestinal spasms, and water retention are also handed down as a purgative. Zhu *et al*., said that in Cameroon, processed data collected from dwellers and indigenous diseases dealers stipulated that *S. alata* is applied for the management of various microbial diseases such as gonorrhea, gastro-biliary and integumentary conditions, and or other problems [10]. Preceding research illustrated the showing of antimycotic agent anthraquinones like aloe-emodin, rhein, emodin, and chrysophanol, and Panichayupakaranant *et al*., said that anthraquinone glycosides (sennosides) with purgative substances [11].

These concluding compounds improve GIT movement, instigate liquid mobility in the gastrointestinal passage, and have undeviated annoyance results). Flavonoids and steroids have also been separated from the leaves, roots, and stems of *S. alata*.

## Materials and Method

### Place and Period of Research

The research was conveyed out in the Microbiology Laboratory of the Faculty of Unani & Ayurvedic Medicine, Hamdard University Bangladesh Gazaria, Munshiganj during the period of January to April 2019.

### Preparation of fine powder of *Senna alata* leaf

*Senna alata* leaves were managed from the garden of Hamdard University Bangladesh. All of the materials were washed with pure and fresh water and sun-dry under the shadow then the dried plants were made into powder by means of the mechanical blender and reserved in an air-tight vessel at ambient temperature until extraction.

### Extracting materials

Extraction of *Senna alata* leaf done by polar (methanol) solvents. The following materials are required while extracting them.

1. Dried *Senna alata* leaf.
2. Methanol 500 ml
3. Distilled water
4. Beaker
5. Hot water bath
6. Drier
7. Weight machine
8. Glass rods
9. Tissue paper
10. Spatula
11. Titrating pipette
12. Foil papers
13. Vial.
14. Blender machine
15. Scissor

### Method of extraction

After blending the *Senna alata* leaf powder has been obtained. After further filtering, the powder was taken out for final extraction. Estimated the dehydrated powder of *Senna alata* leaves by digital electrical balance and obtained 100 gm powder of *Senna alata* leaves. By taking a beaker and pouring out with methanol as per account as 5:1, i.e. 500 ml for 100 gm of *Senna alata* leaves finest granules. Stirred slowly with glass wear like the rod to mingle up the solvent and dry sample for preparing soft fluid. Kept up stirring after a few minutes and managed it for 60 minutes and lid up the beakers with good aluminum foil. Remaining the process the whole night for 2 days. Filtered the solvent with a very fine cloth (white color) differently and got the extract to the water bath then take time till getting dried extract (raw materials). The extraction process of *Senna alata* leaves got after 2 or 3 days of evaporation method where the processing temperature was continuously managed at 40 °C and finally it was gathered by spatula in a marked glass vial. The extracted last portions were left in plastic jars and the vial, containing extract was kept in the refrigerator at a temperature of 4-8 °C.

### Experimental design

Extracts of *Senna alata* leaf *was* used to prepare test disks. 25, 50, 75 and 100 µl extract were shoked in sterile blank disk. *Eschericia coli*, *Streptococcus pyogenes* and *Proteus mirabilis* isolated from patient sample used as pathogenic bacteria to estimate the antibiotic potentiality of *Senna alata* leaves.

## Results and Discussion

**Table 1:** Zone of inhibition produced by methnolic extract of *Senna alata* leaf against *E. coli.*

| Concentration of *Senna alata* | Zone of inhibition in *E. coli* by *Senna alata* leaf | Zone of inhibition by 30 µg Amikacin containing antibiotic disk in *E. coli.* |
|---|---|---|
| 25 µg *Senna alata* leaf extract | 10 mm | 13 mm |
| 50 µg *Senna alata* leaf extract | 15 mm | |
| 75 µg *Senna alata* leaf extract | 20 mm | |
| 100 µg *Senna alata* leaf extract | 28 mm | |

Tabe 01 showed the zone of inhibition produced by methnolic extract of *Senna alata* leaf 25 µg, 50 µg, 75 µg and 100 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *E. coli.*

**Table 2:** Zone of inhibition produced by methnolic extract of *Senna alata* leaf against *S. aureus*.

| Concentration of *Senna alata* leaf | Zone of inhibition in *S. aureus* by *Senna alata* leaf | Zone of inhibition by 30 µg Amikacin containing antibiotic disk in *S. aureus* |
|---|---|---|
| 25 µg *Senna alata* leaf extract | Resistance | 14 mm |
| 50 µg *Senna alata* leaf extract | 9 mm | |
| 75 µg *Senna alata* leaf extract | 14 mm | |
| 100 µg *Senna alata* leaf extract | 19 mm | |

Table-02 revealed the zone of inhibition produced by methnolic extract of *Senna alata* leaf 25 µg, 50 µg, 75 µg and 100 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *S. aureus.*

**Table 3:** Zone of inhibition produced by methnolic extract of *Senna alata* leaf against *Klebsiella pneumoniae*

| Concentration of *Senna alata* | Zone of inhibition in Klebsiella pneumoniae by *Senna alata* leaf | Zone of inhibition by 30 µg Amikacin containing antibiotic disk in *Klebsiella pneumoniae* |
|---|---|---|
| 25 µg *Senna alata* leaf extract | 8 mm | 10 mm |
| 50 µg *Senna alata* leaf extract | 11.5 mm | |
| 75 µg *Senna alata* leaf extract | 15 mm | |
| 100 µg *Senna alata* leaf extract | 21 mm | |

Table 03 showed the zone of inhibition produced by methnolic extract of *Senna alata* leaf 25 µg, 50 µg, 75 µg and 100 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *Klebsiella pneumoniae*.

**Table 4:** Zone of inhibition produced by methnolic extract of *Senna alata* against *Pseudomonas aeruginosa*

| **Concentration of *Senna alata* leaf** | **Zone of inhibition in *Pseudomonas aeruginosa* by *Senna alata* leaf** | **Zone of inhibition by 30 µg Amikacin containing antibiotic disk in *Pseudomonas aeruginosa*** |
|---|---|---|
| 25 µg *Senna alata* leaf extract | Resistance | 9 mm |
| 50 µg *Senna alata* leaf extract | 8.4 mm | |
| 75 µg *Senna alata* leaf extract | 10.0 mm | |
| 100 µg *Senna alata* leaf extract | 16 mm | |

Table 04 showed the zone of inhibition produced by methnolic extract of *Senna alata* leaf 25 µg, 50 µg, 75 µg and 100 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *Pseudomonas aeruginosa*.

**Table 5:** Zone of inhibition produced by methnolic extract of *Senna alata* leaf against *Proteus*

| **Concentration of *Senna alata* leaf** | **Zone of inhibition in *Proteus* by *Senna alata* leaf** | **Zone of inhibition by 30 µg Amikacin containing antibiotic disk in *Proteus*** |
|---|---|---|
| 25 µg *Senna alata* leaf extract | 6 mm | Resistance |
| 50 µg *Senna alata* leaf extract | 10 mm | |
| 75 µg *Senna alata* leaf extract | 13 mm | |
| 100 µg *Senna alata* leaf extract | 18 mm | |

Table 05 showed the zone of inhibition produced by methnolic extract of *Senna alata* leaf 25 µg, 50 µg, 75 µg and 100 µg containing paper disk and 30 µg Amikacin containing antibiotic disk against *Proteus*.

## Conclusion

In this study *Senna alata* extract obtained by macharation method, the antimicrobial activities assessed by agar diffusion method. The result showed good zone of inhibition by this crud extract against pathogenic microorganisms. The *Senna alata* leaf got primary scientific validity; further studies on this medicinal plant will give the effectivity as an antimicrobial plant for using in the formulation of Unani and Ayurvedic Medicine as well as the pharmaceutical row material for modern medicine.

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