

## Original Research

# Black Cumin (*Nigella Sativa*) seed may possess potent ingredient(s) For Antibacterial Activity

Rokeya Parvin<sup>1</sup>, Mitu Akter<sup>1</sup>, Md. Rezaul Alam<sup>1\*</sup>, Shyam Sundar Shaha<sup>2</sup> and Md. Mokhlesur Rahman<sup>3</sup>

<sup>1</sup>Department of Microbiology, Gono Bishwabidyalay, Savar, Dhaka, Bangladesh.

<sup>2</sup>Department of Biochemistry and Molecular Biology, Gono Bishwabidyalay, Savar, Dhaka, Bangladesh.

<sup>3</sup>Department of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay, Savar, Dhaka, Bangladesh.

\* Corresponding Author: Md.Rezaul Alam; Email: [rezaalam@gmail.com](mailto:rezaalam@gmail.com); Mobile: +8801712115200.

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## Abstract

*Nigella Sativa* seed has been widely used throughout civilization. It is kind of panacea that has all the answer in it. Several components of this seed may be involved in antibacterial activity. It has been reported that different pathophysiological conditions are improved by using this seed. It is associated with antioxidant property. It may also be used for its nutritional qualities as dietary supplement. It has also synergistic effect when combined with other drugs. Seeds and oil both have medical values. In a poor country like Bangladesh were seeing a doctor and buying medical drugs is expensive regular intake of *Nigella Sativa* can be a good alternative for keeping a sound health. In USA, FDA certifies *Nigella Sativa* as GRAS. Many investigations were performed for determining antimicrobial activities in recent years. Four bacterial species were used for checking antibacterial properties of this seed. The bacterial species are *Escherichia. coli*, *Pseudomonas. aeruginosa*, *Staphylococcus. aureus* and *Bacillus cereus*. Pour hole methods were used in this experiment. Highest zone of inhibitions was observed as follows, *E. coli* (17mm) *Ps. aeruginosa* (20mm) *S. aureus* (21mm) and *B. cereus* (23mm). No comparative antibiotic study was done for this experiment. In future, comparative studies and components isolation by HPLC method will be performed.

**Keywords:** Pour hole method, Synergistic effect, Zone of inhibition. FDA, GRAS, Panacea, HPLC

## Introduction

Black cumin is widely known for its popular use in different parts of the world. From historical evidence it is apparent that it has widespread applications [1]. The extract of this seed has been used for different kinds of skin disorders [2]. In Arabian chronicle there are praises for this seed. Black cumin seed has been used for both medicinal and culinary purpose. The oil has various skin applications as well as therapeutic applications. Many people from sub-Saharan and Asian countries cannot afford regular expensive treatment and must rely on inexpensive alternative method, like using herbal medicine. Among branch of medicine, Phytomedicine has been being popular for ease of use, easy access, and low cost. It is full of nutritional values. It is used for flavouring of bakeries [3]. Its oil is of important value, locally consumed and seed has been used for crop diversification (Dessalegn & Wubeshet, 2018). Uses of black cumin is well documented in historical texts. It possesses protein, fibre, minerals vitamin. Compositions include 20-85% protein, 7-94% fibre, and 31.94% of total carbohydrates. Seed also possesses iron, copper, zinc, phosphorus, calcium, and folic acid [4].

*Nigella sativa* is a medicinal plant believed to have anti-tumor, anti-diabetic, diuretic, gastro protective, CNS depressant, anti-spasmodic, anti-inflammatory, antioxidant, antimicrobial, anticonvulsant, anxiolytic, anti-helminthic and immune modulatory activities [5]. The seeds extracts is used to treat coughs and remove renal stone and inhibit the growth of cancerous cells [4]. It is used for the treatment of abdominal pain, polio and diarrhoea. Use of black cumin seed oil is very popular in rural and urban areas in our country and is used also in culinary purposes.

## Objectives of the study

Determination of potent antibacterial activity of Black Cumin seed by pour hole method.

## Materials and Methods

### Procedure of Sample Collection

Black cumin seeds were collected from several regions of close proximity of Gono Bishwabidyalay, Savar Dhaka. It was mashed and grinded with ethanol 1:1 w/v ratio in a beaker [6]. The solution extracted through micropore filter to make it bacteria free. 100g seeds powder material were dissolved in 1 liter of distilled water and kept for 24 hours at 25°C. Then mixture passed through a clean sieve into a beaker. Nutrient Agar and Mueller Hinton agar plates prepared. Four test tubes with 5 ml distilled water autoclaved. Tubes labelled with the test organisms names and inoculated. 50 µl organisms dissolved in each media flask then mixed very well. After that mixture poured onto the sterilized media plate. After waiting for 5-10 min three holes were punched by sterilized micropipette and 30 µl, 50 µl, 100 µl were transferred into the holes. After 30-minute interval inoculated plates were incubated at 37°C for 24 h. Next day the zone of inhibition were measured. Methanol, distilled water was used. Staining tray, test tube, beaker, conical flask, inoculating loop, Bunsen burner, micropipette, tips, measurements and, weighing machine, heater, autoclave machine. Nutrient agar, Mueller Hinton Agar.



Figure-1 Nigella Sativa (Black cumin) whole seed and powder forms.

Table 1: Sample collection points

| Number of samples | Collected points         |
|-------------------|--------------------------|
| Sample 1          | Pollybiddut, Savar       |
| Sample 2          | Baipyl, Savar            |
| Sample 3          | Khezurtek bazar, Ashulia |
| Sample 4          | Mazar road, Nolam        |
| Sample 5          | Polashbari, Savar        |

### Organisms Being Tested

Staphylococcus. Aureus, Bacillus. Cereus, Pseudomonas. Aeruginosa, Escherichia. Coli

### Results and Discussion



Figure-1 Sample preparation

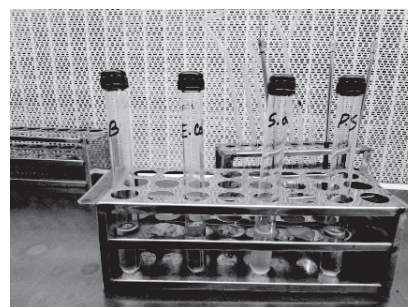


Figure-2 Powder seeds soaked in distilled water

Table 2: Zone of inhibition pattern of *Nigella Sativa* seeds extracts against different bacterial strains.

| Number  | Media | Test Microorganisms | Zone of inhibition |      |       |
|---------|-------|---------------------|--------------------|------|-------|
|         |       |                     | 30µl               | 50µl | 100µl |
| Sample1 | NA    | B.cereus            | 17mm               | 17mm | 19mm  |
|         | NA    | S. aureus           | 17mm               | 18mm | 19mm  |
|         | NA    | E. coli             | 16mm               | 19mm | 20mm  |
| Sample2 | NA    | B.cereus            | 20mm               | 22mm | 23mm  |
|         | NA    | S. aureus           | 20mm               | 20mm | 20mm  |
|         | NA    | E. coli             | 6mm                | 8mm  | 10mm  |
|         | NA    | Ps. aeruginosa      | 22mm               | 22mm | 23mm  |
| Sample3 | NA    | B.cereus            | 12mm               | 13mm | 13mm  |
|         | NA    | S. aureus           | 8mm                | 10mm | 13mm  |
| Sample4 | MHA   | B.cereus            | 17mm               | 23mm | 24mm  |
|         | MHA   | S. aureus           | 20mm               | 21mm | 21mm  |
|         | MHA   | E. coli             | 11mm               | 12mm | 12mm  |
| Sample5 | MHA   | B.cereus            | 10mm               | 12mm | 12mm  |
|         | MHA   | S. aureus           | 9mm                | 10mm | 10mm  |

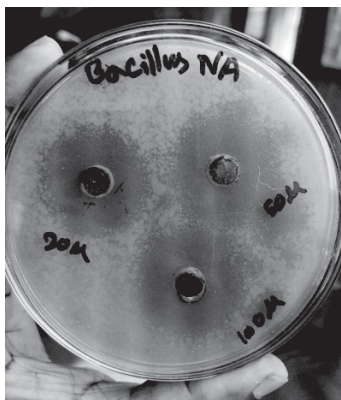
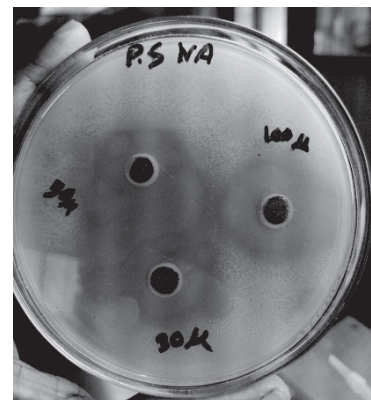
Figure-3: Inhibition zone of seeds extracts against *Bacillus. cereus* (MHA) Date: 23.08.2022.Figure-4 Inhibition zone of seeds extracts against *E. coli* Date: 29.08.2022Figure-5: Inhibition zone of seeds extracts against *Bacillus. Cereus* (NA) Date: 29.08.2022Figure-6: Inhibition zone of seeds extracts against *Ps. aeruginosa* Date: 29.08.2022



Figure-7: Inhibition zone of seeds extracts against *Staphylococcus. Aureus* Date: 29.08.2022

Investigations were performed for antimicrobial properties of black cumin seed. Pour hole method was used. Sign of bacterial growth was evaluated. Clear inhibition zones were observed. Measurements were done at various concentrations against *S. aureus*, *B. cereus*, *E. coli* and *ps. aeruginosa*. Antibacterial activity with max zone of inhibition measured were clearly visible respectively for individual samples. The study clearly indicated that black cumin seeds showed more efficacy against gram positive bacteria than gram negative bacteria. Comparative data with the work of Hamdy in the journal of oleo science state that essential oil showed activity against *E. coli* but no activity was detected for *P. aeruginosa*. There are several advantages of using herbal products. Herbal products do not promote multidrug resistance. Now a days multidrug resistance is a big concern in worldwide health sector. Other advantages include low cost, affordability, eco-friendly etc. Some disadvantages include lack of consistency, risk factors, allergic reactions and toxicity. The weakness of this experiment is that we could not identify active ingredients responsible for antibacterial activities. We can collaborate in future with Pharmacy det. of our university to apply HPLC (High performance Liquid Chromatography) test and Mass spectroscopy test to find out active ingredient. Antibacterial activities of Cumin compared with that of Tulsi (*Ocimum tenuiflorum*). Tulsi leaf showed considerable sensitiveness to growth of *Staphylococcus aureus* (including MRSA) and *Escherichia coli* and partly inhibited the growth of *Pseudomonas aeruginosa* [7,8, 9, 10]

### Conclusion

It is always fascinating to boost immunity through natural process. *Nigella Sativa* may provide exactly such opportunities. It has anti-inflammatory, immunity boosting, sugar controlling activities. It may act as panacea against bacterial pathogens. Now a days we have antibiotic resistance bacteria for which antibiotic is of no use. Medicinal plants like black cumin might be effective, nontoxic, and inexpensive and easily accessible. Lot of scientific research going on the efficacy of using medical plants to treat multiple types of disease. Current study clearly indicates that black cumin shows zone of inhibition and has antibacterial activities. As zone of inhibition indicates antibacterial components present in black cumin. The isolation and identification of active ingredient responsible for antibacterial property is currently beyond our capabilities. But in future we will collaborate with Pharmacology and Toxicology lab of Pharmacy dept. of our university to isolate the active ingredient.

### Authors Contribution's

Md. Rezaul Alam Supervised and guided the research process, providing overall direction and expertise. Mitu Akter and Rokeya Parvin: Collected data of Black Cumin (*Nigella Sativa*) seed and performed the work in lab. Shyam Sundar Shaha and Mokhesur Rahman Evaluated, reviewed the study and contributed to paraphrasing and enhancing the research manuscript.

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### Conflict of interest

The authors declare that they do not have any conflict of interest.

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