

# Antibacterial action of *Cuminum cyminum* on human pathogen.

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**ABSTRACT:** As we have advance in medical science and new drug approaches, there is increasing problems of multi-drug resistance, to overcome this issue we need to look into natural alternative approaches to treat the ailments, thus in this research medicinal plant will be screened for its antibacterial effect. The antibacterial activity of cumin was investigated in the current experiments against three pathogens, two gram negative bacteria and one gram positive bacteria, to see if there was any potential for growth suppression on solid media. In the present study the methodology used is well diffusion and broth turbidity method. Crude and glycerol extract of garlic was used to inhibit *E.coli*, *S. aureus* and *S.typhi*. The antibacterial activity of CUMIN *S. typhi*, *S. aureus* and *E. coli* was assessed on the basis of Well-diffusion method in MH media with crude and glycerol extract of CUMIN. Effect of antibacterial activity of CUMIN against *S. typhi*, *S. aureus* and *E. coli* was highly effective. It can be concluded that such traditional herbs can be useful as alternate treatment to over come the problems of multi drug resistance.

**KEYWORDS:** Anti-bacterial, cumin, zone of inhibition, potency

## I. INTRODUCTION

Natural resources have long provided therapeutic substances, and the use of medicinal plants, particularly in traditional medicine, is well recognised [1]. Antibiotic resistance has recently become an international issue. It is a serious problem while treating different diseases because pathogen resistance to various medications is fairly widespread. The main causes of medication resistance are inappropriate use of widely available antibiotics, extended hospital stays, and inadequate infection control procedures. The hunt for new, risk-free antibacterial medicines that are also efficient and reliable has been prompted by this. The physiological activity of medicinal plants can be demonstrated through the extraction of several bioactive components. Additionally, it aids pharmacological research that results in the creation of a more powerful medicine with lower toxicity [2]. Furthermore, the active ingredients of herbal products have the benefit of being blended with other substances that seem to be inactive, and these complementary ingredients give the plant as a whole safety and efficacy, which are significantly higher than those of its isolated and pure active components [3]. In therapeutic procedures, the utilisation of plant extracts and phytochemicals, both of which have recognised antibacterial characteristics, can be quite significant [4,5]. Additionally, the food business is searching for natural preservatives or additives, which are preferred since they are safer, flavour enhancers, and have no negative side effects in comparison to synthetic or chemical additives [6]. In spite to being used in food preparations all over the world for flavour and taste, spices are also known for their medicinal, antioxidant, antibacterial, and food stabilising capabilities. According to reports, a variety of medicinal plants and spices can stop germs from growing in cultures [5-8]. India, South East Asia, and Arabia all frequently utilise the spice condiment cumin (*Cuminum cyminum*). The family Apiaceae includes cumin, often known as Kashmiri jeera or jeera in other regions. Cumin is well-known for its astringent, antispasmodic, diuretic, carminative, and stimulating effects. Many pathogens, including *Escherichia coli*, *Staphylococcus aureus*, *Salmonella species*, *Bacillus cereus*, and *Aspergillus niger*, claim to be inhibited by the aqueous extract of cumin [8,9,10]. The composition, ingredient concentration, and extraction process are a few variables that impact how effective the extract is.

## II. MATERIAL AND METHODS

The Selected bacterial species are *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*. Bacterial species were collected from laboratory of Dept. of Microbiology, Govt. Holkar Science College, Indore. Selected Plant species is CUMIN. Selected Organic solvent is Glycerol and distilled water.

The Cumin extract was prepared. The glassware's used for the extract preparation were sterilized by autoclaving. The aqueous extract was prepared by [11]. 10% of aqueous extract was prepared. For this 10 gm of plant part was taken, and grinded with pestle and mortar. 100ml of distilled water was taken in which 10gm of grinded plant was added. It was then heated until it became nearly half i.e. approximately 50ml. It was then filtered into test tube with the help of Watman filter paper no.1. Now the filtered solution was centrifuged at 2000rpm for 2 minutes. The supernatant which was containing clear, fresh extract of respective plant was used for experimental work. The glycerol extract was prepared by [12]. Fresh plant material was collected and then washed under tap water for 2-3 times for the removal of extra debris, mud etc. It was then cut into fine pieces and again washed with the distilled water for clearing of material. Now 90% solution of glycerol (90ml of glycerol with 10ml of distilled water) was taken into which 10gm of plant material was added. It was then crushed with pestle and mortar till fine paste was obtained. It was then filtered with the help of Watman filter paper no.1. Filtered solution was centrifuged at 5000rpm for 5minutes. Pellet was discarded and supernatant was be used for experimental work. The use of Mueller Hinton media is recommended for organism. The susceptibility of bacteria against different parts of medicinal plants was tested by well diffusion method [13].

## III. RESULT AND DISCUSSION

The antibacterial activity of CUMIN *S. typhi*, *S. aureus* and *E. coli* was assessed on the basis of Well-diffusion method in MH media and Growth inhibition in Nutrient broth media method with crude and glycerol extract of CUMIN. The crude extract of

CUMIN was most efficient against the *S. typhi* followed by *S. aureus* and then by *E. coli*. The inhibition zones were 10, 15 and 22 mm against *E. coli*, *S. aureus* and *S. typhi* respectively.

The size based order of inhibition zone was observed as:

***S. typhi* > *S. aureus* > *E. coli***

The glycerol extract of CUMIN was also effective against all the three bacteria under study. It gave maximum inhibition zone against *S. aureus* followed by *E. coli* and then *S. typhi*. The inhibition zones were 10, 12 and 09 mm against *E. coli*, *S. aureus* and *S. typhi* respectively.

The size based order of inhibition zone was observed as:

***S. aureus* > *E. coli* > *S. typhi***

On comparison it was observed that the antibacterial activity of CUMIN on *E. coli* was maximum and equally effective in both crude and glycerol extract. The inhibition zones were 10mm in both crude and glycerol extract.

The order of effectiveness of extract was observed as:

**Crude extract = Glycerol extract**

The *S. aureus* was maximum inhibited in crude extract of CUMIN. The inhibition zones were 15mm and 12mm in Crude and Glycerol extract respectively.

The order of effectiveness of extract was observed as:

**Crude extract > Glycerol extract**

The *S. typhi* was also maximum inhibited in crude extract of CUMIN. The inhibition zones were 22mm and 09mm in crude and glycerol extract respectively.

The order of effectiveness of extract was observed as:

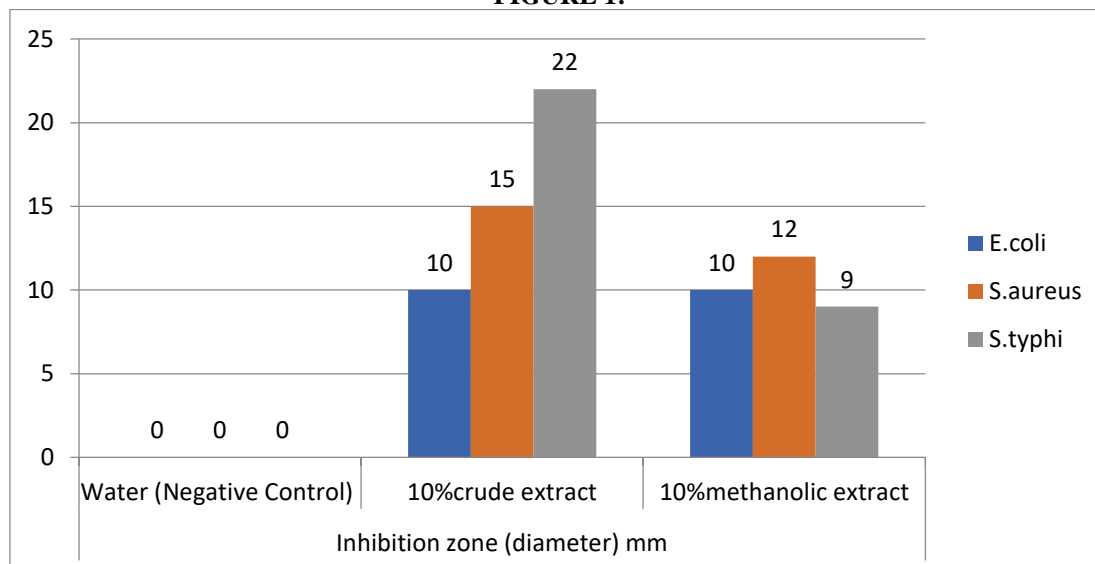
**Crude extract > glycerol extract**

#### Antibacterial activity of CUMIN extract against different bacteria shown by well diffusion method

TABLE 1:

S. No.	Organism	Inhibition zone (diameter) mm		
		Water (Negative Control)	10%crude extract	10%glycerol extract
1.	<i>E.coli</i>	00	10	10
2.	<i>S.aureus</i>	00	15	12
3.	<i>S.typhi</i>	00	22	09

FIGURE 1:



#### IV. CONCLUSION

Cuminaldehyde (61.65%) was present in considerable amounts in the cumin extract used in this study.

Cumene, p-cymene, -pinene, acetic acid, p-cymen-7-ol, and terpinene were among the extract's other ingredients. These results concur with earlier research, but to a different degree [14,16]. Numerous chemical elements included in cumin extract contribute to its antimicrobial activity [16,22]. Cumin has also been demonstrated to have hydrophobic properties that can degrade the lipids found in bacterial cell walls and mitochondria, harming the bacterial cells' structural integrity [16]. Numerous research have focused on antibiotic-resistant bacteria to determine the antibacterial impact of cumin extract on a variety of human pathogenic pathogens [14].

In the present study, the antibacterial activity of CUMIN was studied against 1 gram positive and 2 gram negative bacteria that are *Staphylococcus aureus*, *Escherichia coli* and *Salmonella typhi* respectively. For identifying the susceptibility of all bacteria towards the medicinal plant, 2 different types of extracts were used. The crude and glycerol extract was prepared. The susceptibility was tested by the well-diffusion method and growth inhibition in broth method.

All *Staphylococcus aureus*, *Escherichia coli* and *Salmonella typhi* gave different result in all the extract of medicinal plant by well diffusion method..

Effect in MH agar media: The crude extract of CUMIN was most efficient against the treatment of *S. typhi* followed by *S. aureus* and then by *E. coli*. The glycerol extract of CUMIN was also effective against all the three bacteria under study. It gave maximum inhibition zone against *S. aureus* followed by *E. coli* and then *S. typhi*. The glycerol extract of CUMIN was also effective against all the three bacteria under study. It gave maximum inhibition against *S. typhi* followed by *S. aureus* and then *E. coli*. Like this we can say CUMIN has got intense antibacterial activity. Crude extract has shown good activity against all the bacteria in solid media, in broth glycerol and crude both had almost equivalent activity.

The result of present investigation shows the antibacterial activity of CUMIN against different studied bacteria, thus the result of present investigation is supported by above mentioned author's results.

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