



ANTIMICROBIAL ACTIVITY OF HONEY AND GINGER (*ZINGIBER OFFICINALE*) ON *ESCHERICHIA COLI*

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ABSTRACT

The development of new antimicrobial agents against resistant pathogens is increasing interest. This work aims to evaluate the antimicrobial potential of ethanolic and water extracts of Honey and Ginger (*Zingiber officinale*) on *E.coli*. Agar well diffusion method has been used to determine the antimicrobial activities and minimum inhibitory concentrations (MIC) of this two extracts against pathogenic microorganism. The antimicrobial effects of the plant extracts are sufficient in a way to cater the healing effect. Those plants extracts which proved to be potentially effective can be used as natural opportunity preventives to manipulate meals poisoning illness and keep meals stuff averting healthy risk of chemically antimicrobial agent application. The present work shown that *E.coli* were susceptible to crude extract of ginger and honey in vitro which means the honey and ginger has antibacterial property it's far hereby encouraged that similarity studies be completed in the direction of isolating, performing and standardizing the activity antibacterial elements the both additionally more work should be done to determine pharmacokinetics, pharmacodynamics and possible toxicity of the pharmaco active components.

Keywords: Honey, Ginger, Antimicrobial activity, Medicinal property.

INTRODUCTION

Antibiotics are very important for lowering the prevalence of bacterial infections globally, but with the increasing number of resistant pathogens, the effectiveness of the antibiotics has been reduced. Several research groups have focused their efforts on finding alternative antimicrobial agents, which leads to re-evaluation of the therapeutic use of drugs such as ancient plants, products and their extracts. The use of traditional medicine to treat infection has been practiced since the origin of mankind, and honey produced by *Apis mellifera* (*A. mellifera*) is one of the oldest traditional medicines considered to be important in the treatment of several human ailments. Nature has been a source of medicinal agents for thousands of years and a large number of modern drugs have been isolated from natural sources. Herbal medicine is the oldest known healthcare system known to mankind. Currently, many

researchers have reported the antibacterial activity of honey and found that natural unheated honey has some broad-spectrum antibacterial activity when tested against pathogenic bacteria, oral bacteria as well as food spoilage bacteria in most ancient cultures honey have been used for both nutritional and medicinal purposes. Food borne disease have always been a major concern in both developing and developed countries.

Campylobacter jejuni, *Staphylococcus aureus*, *Salmonella* (over 1600 types), *Escherichia coli* O157:H7, *Streptococci*, etc. are some of the major bacterial species that causes food borne diseases. *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas* spp. are the true bacteria belong to Kingdom Eubacteria as per classification of six kingdom system (Verma, 2017; Verma and Prakash, 2020). *Staphylococcus aureus* is a Gram-positive, round shaped

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bacterium (Rane and Patel, 2021). *E. coli* are the most commonly found bacterium in the human intestinal tract. Under normal conditions, its presence is conducive to digestive processes. But when present in excess or in virulent form it causes diseases. Virulent strains of *E. coli* can cause gastroenteritis, urinary tract infections, neonatal meningitis etc. With increasing use of drugs microorganisms are attaining resistance to commonly used antibiotics, which leads to downfall of effectiveness of conventional medicines and therefore, search for new antimicrobial agents has become necessary. Traditional medicines have been used for many centuries by a substantial proportion of the population of India. The interest in the study of medicinal plants as a source of pharmacologically active compounds has increased worldwide. It is recognized that in developing countries like India. Plants are the main medicinal source to treat infectious diseases. Approximately 20% of the plants found in the world have been subjected to pharmacological or biological test, and a substantial number of new antibiotics introduced in the market are obtained from natural or semi-synthetic resources. The active ingredients of plants against microorganism are mostly some of the secondary metabolites (i.e. alkaloids, glycosides etc) that are present in abundance in herbs and spices commonly used in Indian food preparations. Herbs are small plants used by human beings for various purposes like medicines, food supplements for imparting flavour or scant and as a part of offering to God since beginning of civilization. Spices have been defined as plant substances from indigenous or exotic origin, aromatic or with strong taste, used to enhance the taste of foods.

The use of conventional medication to combat infections in recognized seeing that historical times. Honey is one of the oldest antimicrobial sellers, used inside the natural unheated honey has a extensive variety of antibacterial pastime and has been tested towards pathogenic bacteria, bacterial plant life in the mouth and micro- organisms related to food spoilage.

MEDICINAL PROPERTY

The belief that honey is nutrient, a drug and an ointment has been carried our days, and thus, an alternative medicine branch, called apitherapy, has been developed in recent years, offering treatments based on honey and other bee products against many diseases including bacterial infections. Honey is as nectar gathered, modified, stored and sealed by honeybee in

well planned and architected hexagonal comb cells. The honey gets place as an antiseptic, laxative, antibiotic, pacifier, anti-oxidant and ingredient of variety of pharmaceutical, confectionary, cosmetics and bakery industries (Balasubramanyam, 2021).

At present a number of honey are sold with standardized levels of antibacterial activity. The *Leptospermum scoparium* (*L. scoparium*) honey, the best known of the honey, has been reported to have an inhibitory effect on around 60 species of bacteria, including aerobes and anaerobes, gram-positive and gram-negative (*Tan et al*) reported that Taulang honey has variable but broad-spectrum activities against many different kinds of wounds and enteric bacteria. Unlike glucose oxidase, the antibacterial properties from *Leptospermum* spp. Honey are light and heat-stable. Natural honey of other sources can vary as much as 100-fold in the potency of their antibacterial activities, which is due to due to hydrogen peroxide. In addition, honey is hygroscopic, which means that it can draw moisture out of the environment and dehydrate bacteria and its high sugar content and low level pH can also prevent the microbes from growth.

Ginger (*Zingiber officinale*) has long been used as naturopathy due to their potential antimicrobial activity against different microbial pathogens. Ginger (*Zingiber officinale*) is a medicinal plant that has been widely used all over the world, since antiquity for a wide array of unrelated ailments including arthritis, cramps, rheumatism, sprains, sore throats, muscular aches, pains, constipation, vomiting, hypertension, indigestion, dementia, fever and infectious diseases (Ali, 2008). Ginger has direct anti-microbial activity and thus can be used in treatment of bacterial infections (*Tan and Vanitha*, 2004). Ginger belongs to *Zingiberaceae* family (Sharma, 2010). The *Zingiberaceous* plants have strong aromatic and medicinal properties and are characterized by their tuberous or non-tuberous rhizomes (Chen, 2008). Ginger is relatively inexpensive due to their easy availability, universally acceptable and well tolerated by the most people.

MATERIALS AND METHODS

The prevailing observe become performed within the department of Zoology, Lokneta Vyankatrao Hiray Arts, commerce & science College Panchavati, Nashik.

The Microorganisms

Microbial strains were selected for experiment on the basis of their pathogenic activity in human beings that is *Escherichia coli*.

Bacterial strains and culture conditions

Eschericia coli Microbial type culture collection 497 culture was subcultured in mitis salivarius (MS) agar and was anaerobically incubated at 37°C for 48 hours.

Collection of Plant materials:

Honey is purchased from apiculture unit, Gangapur, Nashik. and ginger rhizomes have been bought on the Ojhar (mig) market.

Chemicals:

The chemicals used for the work are peptone, agar, sodium chloride, meat extract and water.

Assay for Antimicrobial Activity

Antibacterials are agents that kill microorganisms or inhibit their growth. The antimicrobial effects of the plant extracts are sufficient in a way to cater the healing effect.

Paper Disc Method

Filter paper discs (6mm diameter) were prepared using a punch machine. Filter paper discs were sterilized in a dry heat sterilizer and kept in the refrigerator for further use. The inoculum was separated uniformly in Nutrient- agar plates and kept for five minutes. Pre-sterilized paper discs were dipped into different samples (Ginger and Honey extracts) placed in inoculated plates. The plates were incubated for 24 hrs. At 37°C and size of clear zones developed surrounding each disc was measured by scales to the nearest mm and were plotted in the graph.

Table: Zone of inhibition of Honey and Ginger against *E. coli* in paper disk method.

Material M Conc. in %	25	50	75	100
Ginger	10	12	15	16
Honey	07	08	12	16

(Zone of diameter in mm)

Minimum Inhibitory Concentration (MIC)

Paper Disc Diffusion method

Determination of MICs of the honey and ginger extracts was done by paper disk diffusion and agar dilution techniques and the extracts used were 25,50,75,100/ml. The lowest concentration that did not permit visible growth when compared with the control was considered as the minimum inhibitory concentration.

RESULTS AND DISCUSSION

From the antibacterial screening assessments of the crud extract of *A. indica* executed on the chosen bacterial isolates *E. coli*. In present study, antimicrobial activity of two species honey and ginger had been carried out. Table shows the antimicrobial hobby of ginger extract and suggests the maximum zone of inhibition is 16mm. Further, the antimicrobial activity of honey maximum area of inhibition is 16mm.

The present work shown that *E.coli* were susceptible to crude extract of ginger and honey *in vitro* which means

the honey and ginger has antibacterial property it's far hereby encouraged that similarly studies be completed in the direction of isolating, performing and standardizing the activity antibacterial elements the both additionally more work should be done to determine pharmacokinetics, pharmacodynamics and possible toxicity of the pharmaco actives components.

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