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Antibacterial and Anti-Biofilm Activities of Honey and Ginger against Clinical Isolates of *Staphylococcus Aureus* and Bacillus SPP

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Abstract **Original Research Article**

Antimicrobial resistance has necessitated the exploration of alternative therapeutic agents derived from natural products. This study evaluate the antibacterial efficacy of honey and ginger (Zingiber officinale) against throat-associated bacterial isolates, Staphylococcus aureus and Bacillus spp. Using standard microbiological techniques, bacterial isolates were obtained and identified from throat swabs. Antibacterial activity was assessed using agar well diffusion and broth micro dilution methods. Results demonstrated concentration-dependent inhibitory effects of both honey and ginger, with honey exhibiting greater antibacterial potency. The findings support the potential application of natural products as complementary antimicrobial agents.

Keywords: Antimicrobial resistance, Honey, Ginger (Zingiber officinale), Antibacterial activity, Natural therapeutics.

Introduction

The global increase in antimicrobial resistance poses a major public health challenge, reducing the effectiveness of conventional antibiotics. Natural products have historically served as sources of therapeutic agents, particularly in traditional medicine. Honey and ginger are widely used in African ethnomedicine for the treatment of respiratory and gastrointestinal infections. Honey exhibits antimicrobial properties attributed to its acidity, osmotic pressure, hydrogen peroxide content, and phytochemicals, while ginger contains bioactive compounds such as gingerols and shogaols with proven antibacterial activity. This study investigates the antibacterial effects of honey and ginger against clinically relevant throat-associated bacteria.

Study Area

The study was conducted at the Microbiology Laboratory, Veritas University, Abuja, Nigeria. The institution is located within Bwari Area Council of the Federal Capital Territory and provides laboratory facilities suitable for microbiological research.

Methodology

Sample Collection

Throat swab samples were collected aseptically from consenting students using sterile swab sticks.

Isolation and Identification of Bacteria

Samples were cultured on nutrient agar and incubated at 37°C for 24 hours. Isolates were identified based on colonial morphology, Gram staining, and biochemical tests including catalase, oxidase, and methyl red tests.

Preparation of Honey and Ginger Extracts

Pure honey was obtained from a local apiary. Ginger rhizomes were washed, air-dried, pulverized, and extracted using cold maceration in ethanol. Extracts were concentrated using a water bath.

Antibacterial Assay

Antibacterial activity was evaluated using the agar well diffusion method. Zones of inhibition were measured in millimeters. Minimum inhibitory concentrations (MICs) were determined using broth dilution.

Statistical Analysis

Data were analyzed using descriptive statistics, and results were expressed as mean ± standard deviation.

Results

Table 1: Zones of Inhibition (mm)

Extract	**Concentration**	*S. aureus*	*Bacillus* **spp.**
Honey	100%	10.0	8.0
Honey	80%	8.0	4.0
Ginger	100%	8.0	10.0
Ginger	80%	6.0	4.0

Discussion

The results demonstrate that both honey and ginger possess antibacterial activity against the tested organisms, with honey showing stronger inhibitory effects against *Staphylococcus aureus*. These findings align with previous studies reporting the antimicrobial properties of honey and ginger. The concentration-dependent activity observed suggests that higher extract concentrations enhance antibacterial efficacy. The effectiveness of honey may be attributed to its multifactorial antimicrobial mechanisms, while ginger's activity is linked to its phenolic compounds.

Conclusion

Honey and ginger exhibit significant antibacterial activity against throat-associated bacterial pathogens. These natural products may serve as complementary agents in managing bacterial infections, particularly in the context of rising antibiotic resistance.

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