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Evaluation Of Antimicrobial Activity Of *Eragrostis Tenella* And *Dinebra Retroflexa* Extracts

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ABSTRACT

Introduction: This study explores the antimicrobial potential of *Eragrostis tenella* and *Dinebra retroflexa*, medicinal plants from the Poaceae family. The rising challenge of antibiotic resistance has prompted researchers to investigate alternative therapeutic agents, with medicinal plants being considered for their bioactive compounds. These plants are traditionally used in various cultures, yet their antimicrobial properties remain largely unexplored. **Methods:** Fresh plant materials of *Eragrostis tenella* and *Dinebra retroflexa* were collected, authenticated, and extracted using cold maceration with ethanol. Phytochemical screening of the extracts was conducted to identify bioactive compounds such as alkaloids, flavonoids, tannins, and saponins. The antimicrobial activity of the plant extracts was tested against two bacterial strains: *Streptococcus Bacillus* (Gram-positive) and *Escherichia coli* (Gram-negative), using the agar well diffusion method. The size of the inhibition zones was measured after incubation at 37°C for 24 hours. **Results:** The antimicrobial testing revealed that *Eragrostis tenella* exhibited a significant inhibition zone of 13 mm against *S. Bacillus* and 6 mm against *E. coli*. *Dinebra retroflexa* demonstrated zones of 10 mm against *S. Bacillus* and 8 mm against *E. coli*. The standard antibiotic, Amoxicillin, showed inhibition zones of 17 mm for *S. Bacillus* and 13 mm for *E. coli*, confirming the effectiveness of the testing method. **Discussion:** Both *Eragrostis tenella* and *Dinebra retroflexa* displayed promising antimicrobial activity, particularly against Gram-positive bacteria, consistent with the structure of bacterial cell walls. The phytochemical compounds present in both plants likely contribute to their antimicrobial effects. Although the inhibition zones were smaller compared to the standard antibiotic, the results support the potential of these plants as natural antimicrobial agents. **Conclusion:** This study demonstrates that *Eragrostis tenella* and *Dinebra retroflexa* possess antimicrobial properties, with significant activity against both Gram-positive and Gram-negative bacteria. These plants show potential for further development into natural therapeutic agents. Additional studies, including the isolation of active compounds and clinical testing, are recommended to explore their full antimicrobial potential.

KEYWORDS

Antimicrobial activity, *Dinebra retroflexa*, *Eragrostis tenella*, phytochemical screening, medicinal plants.

INTRODUCTION

Antibiotic resistance has emerged as one of the most critical global health challenges of the 21st century. With the overuse and misuse of antibiotics, many bacterial strains have evolved mechanisms to evade the effects of conventional drugs. This has led to an urgent need for alternative therapeutic agents that can address resistant bacterial infections. Medicinal plants, which have long been used in traditional healing practices, are increasingly being recognized for their potential to serve as sources of new antimicrobial agents. These plants contain an array of bioactive compounds, such as alkaloids, flavonoids, tannins, and saponins, that possess potent antimicrobial properties. Historically, these bioactive molecules have been the basis for various treatments in herbal medicine, but their modern scientific evaluation, particularly in terms of antimicrobial activity, is still limited.[1,2,3,4]

Two plants from the Poaceae family, *Eragrostis tenella* and *Dinebra retroflexa*, are traditionally used in various cultural contexts for treating a range of ailments. *Eragrostis tenella*, commonly known as lovegrass, is a tropical grass species that has been explored in relation to its ecological and agricultural properties but remains under-investigated as a source of bioactive compounds with antimicrobial potential. Similarly, *Dinebra retroflexa*, another species in the Poaceae family, has been utilized for its medicinal properties, particularly in ethnobotany, yet its antimicrobial activity has not been systematically studied. The antimicrobial properties of these plants could offer promising alternatives to synthetic antibiotics, especially in light of the growing concern over multidrug-resistant bacterial strains. The purpose of this research is to investigate the antimicrobial potential of *Eragrostis tenella* and *Dinebra retroflexa* extracts by focusing on their ability to inhibit the growth of specific bacterial strains, thereby contributing to the search for alternative, plant-based antimicrobial agents.[5,6,7,8]

Over the last few decades, numerous studies have demonstrated the effectiveness of plant-derived compounds in combating microbial infections, particularly those caused by antibiotic-resistant pathogens. Many medicinal plants, when scientifically validated, have proven to possess significant antimicrobial properties that are both diverse and potent. For example, compounds such as flavonoids and tannins, found in a wide range of plants, have been shown to possess broad-spectrum antimicrobial activity, inhibiting the growth of bacteria, fungi, and viruses. However, despite the wealth of research in this area, many plant species have yet to be thoroughly studied for their antimicrobial potential. The Poaceae family, in particular, is relatively under-explored in the context of antimicrobial research, with most studies focusing on other families like Asteraceae or Lamiaceae.[9,10,11,12]

In the context of *Eragrostis tenella* and *Dinebra retroflexa*, there is a significant gap in the literature regarding their antimicrobial properties. While these plants have been recognized for their medicinal uses in traditional medicine, their chemical composition, particularly in terms of bioactive compounds with antimicrobial properties, remains largely uncharacterized. A key challenge in this area is the need for comparative studies that evaluate the antimicrobial activity of plants from the same family. This comparison is crucial as plants within the same family often share similar phytochemical profiles, yet their individual antimicrobial efficacy may vary depending on specific compounds present in different species. By evaluating the antimicrobial

activity of *Eragrostis tenella* and *Dinebra retroflexa* extracts, this study aims to fill a significant gap in knowledge, potentially unlocking new therapeutic applications for these plants. [13,14,15,16]

The primary aim of this research is to evaluate the antimicrobial activity of extracts from *Eragrostis tenella* and *Dinebra retroflexa*. Given the increasing interest in plant-derived antimicrobial agents, it is crucial to systematically assess the effectiveness of these plants against common bacterial pathogens. Specifically, the study focuses on two bacterial strains: *Streptococcus Bacillus* (a Gram-positive bacterium) and *Escherichia coli* (a Gram-negative bacterium), both of which are known to cause a wide range of infections in humans. The comparative study of these two bacterial strains is significant because Gram-negative bacteria, such as *E. coli*, are generally more resistant to antimicrobial agents due to their outer membrane, which acts as a barrier to many drugs. This contrasts with Gram-positive bacteria like *S. Bacillus*, which have a simpler cell wall structure that is often more susceptible to antimicrobial agents. By testing both Gram-positive and Gram-negative bacteria, this study will provide insight into the spectrum of antimicrobial activity exhibited by the plant extracts.[17,18,19,20]

MATERIALS AND METHODS

Study Design:

This study follows an experimental design aimed at evaluating the antimicrobial potential of *Eragrostis tenella* and *Dinebra retroflexa*. The study was structured in multiple phases: collection and preparation of plant samples, extraction of bioactive compounds, phytochemical screening, and antimicrobial testing. The antimicrobial activity of the plant extracts was assessed using the widely recognized agar well diffusion method. This method is effective for evaluating the ability of plant extracts to inhibit the growth of microorganisms by observing the clear zones formed around wells filled with extracts. Additionally, phytochemical screening was conducted to identify key bioactive compounds present in the extracts, which are thought to be responsible for the observed antimicrobial properties.[21,22,23,24,25,26]

Participants/Sample:

1. **Plant Samples:**

The plant samples for this study, *Eragrostis tenella* and *Dinebra retroflexa*, were collected from Dhayarkarvasti, Dudulgaon, Pune. These plants were selected based on their traditional medicinal uses and ecological availability. Fresh specimens of both species were carefully identified and authenticated by a botanist at a recognized botanical survey center.

After collection, the plants were cleaned thoroughly to remove any soil, dust, or debris, ensuring that the plant materials used in the study were free from external contaminants that could affect the accuracy of the results.

2. **Microbial Strains:**

The antimicrobial activity of the plant extracts was tested against two bacterial strains:

- **Gram-positive bacteria:** *Streptococcus Bacillus*, commonly associated with respiratory and skin infections.
- **Gram-negative bacteria:** *Escherichia coli*, a pathogen commonly responsible for gastrointestinal and urogenital infections.

Both bacterial strains were obtained from a certified laboratory culture collection. The bacteria were sub-cultured and maintained in a nutrient broth prior to use in the experiment. For each test, bacterial suspensions were adjusted to a standard concentration to ensure consistent inoculation across the experimental conditions.

Data Collection Methods:

1. **Phytochemical Screening:**

Phytochemical screening is an essential step to identify the bioactive compounds present in the plant extracts that may contribute to antimicrobial activity. The extracts were screened using a series of qualitative tests to detect various classes of compounds known for their antimicrobial properties. The following standard tests were performed:

- **Alkaloids:**
  The presence of alkaloids was detected using the Mayer's test. An aliquot of the extract was treated with a few drops of Mayer's reagent (potassium mercuric iodide), and the formation of a cream or white precipitate indicated the presence of alkaloids.
- **Flavonoids:**
  The Shinoda test was used to detect flavonoids. To the plant extract, a few drops of sodium hydroxide solution were added. The development of a yellow color indicated the presence of flavonoids, which are known for their antioxidant and antimicrobial activities.
- **Glycosides:**
  Molisch's test was used to detect the presence of glycosides. A few drops of Molisch's reagent (α-naphthol solution) were added to the plant extract, followed by the careful addition of concentrated sulfuric acid. The formation of a red or purple ring at the interface of the acid and extract layer indicated the presence of glycosides.
- **Tannins:**
  Ferric chloride test was used to test for tannins. A few drops of 5% ferric chloride solution were added to the plant extract, and the formation of a blue-black or greenish-black color confirmed the presence of tannins, which are known for their astringent and antimicrobial effects.
- **Saponins:**
  The Froth test was used to detect saponins. A small volume of the extract was shaken with water for 15 minutes. The formation of a persistent froth layer indicated the presence of saponins, compounds that have surfactant properties and may disrupt microbial cell membranes.

These tests were performed on both aqueous and alcoholic extracts of *Eragrostis tenella* and *Dinebra retroflexa* to assess the diversity of bioactive compounds in the plant material.

2. **Antimicrobial Testing (Agar Well Diffusion Method):**

The agar well diffusion method was employed to evaluate the antimicrobial activity of the plant extracts. This method involves the diffusion of antimicrobial agents (in this case, plant extracts) from wells created in agar plates that have been inoculated with bacterial cultures. The key steps in the method are as follows:

- **Preparation of Nutrient Agar Plates:**

Nutrient agar plates were prepared by dissolving 28 grams of nutrient agar powder in 1 liter of distilled water. The solution was heated until the agar was completely dissolved, and the pH was adjusted to 7.4 ± 0.2 using 0.1N NaOH or HCl, if necessary. The agar was sterilized by autoclaving at 121°C for 15-20 minutes. After sterilization, the agar was poured into sterile Petri dishes and allowed to solidify under aseptic conditions.

- **Inoculation of Bacterial Strains:**

The bacterial strains (*S. Bacillus* and *E. coli*) were grown in nutrient broth and adjusted to a concentration of approximately 1×10^8 CFU/mL using a McFarland standard. A sterile cotton swab was dipped into the bacterial suspension and spread evenly across the surface of the solidified nutrient agar plates. This ensured that the bacterial growth was uniform across the entire surface.

- **Application of Plant Extracts:**

After the inoculation, sterile cork borers of 6-8 mm in diameter were used to create wells in the center of the agar plates. A measured volume (50–100 µL) of the plant extracts was carefully added to each well. For comparison, wells were also filled with a known concentration of the standard antibiotic Amoxicillin. A control well containing only solvent (ethanol or distilled water) was included to rule out the effects of the solvents on bacterial growth.

- **Incubation and Measurement of Inhibition Zones:**

The inoculated plates were incubated at 37°C for 24 hours. During incubation, if the plant extracts possessed antimicrobial properties, they would diffuse from the wells into the surrounding agar, creating clear zones of inhibition where bacterial growth was prevented. The diameter of the zones of inhibition was measured in millimeters using a transparent ruler. The presence of larger inhibition zones indicated stronger antimicrobial activity.

3. **Data Analysis:**

The size of the inhibition zones was measured in millimeters (mm). The antimicrobial activity was assessed by comparing the inhibition zones of the plant extracts with those of the standard antibiotic (Amoxicillin). The results were analyzed qualitatively, focusing on the presence or absence of inhibition around the wells, and quantitatively, by measuring the size of the inhibition zones.

The comparison of the inhibition zones for *Eragrostis tenella* and *Dinebra retroflexa* extracts with the standard antibiotic provided insight into the relative antimicrobial efficacy of the plant extracts. Larger inhibition zones suggest a stronger antimicrobial effect, while smaller or no inhibition zones indicate weaker or no antimicrobial activity.

Additionally, statistical analysis (such as mean comparison) was performed to determine the significance of the differences in antimicrobial activity between the plant extracts and the standard antibiotic. A statistical test, such as the Student's t-test, could be used to assess whether the differences in inhibition zones are statistically significant.

OBSERVATION RESULTS

Phytochemical Correlation:

The phytochemical screening of *Eragrostis tenella* and *Dinebra retroflexa* extracts revealed the presence of several bioactive compounds that are known to be associated with antimicrobial activity. These compounds include alkaloids, flavonoids, tannins, phenols, and saponins. Each of these phytochemicals plays a crucial role in the antimicrobial mechanisms of the plants. The observed antimicrobial activity is likely due to several factors, including:

- **Disruption of Microbial Cell Membranes:** Compounds like saponins and flavonoids have surfactant properties that can damage the integrity of bacterial cell membranes, leading to leakage of cellular contents and eventually cell death.
- **Inhibition of Bacterial Protein and Enzyme Synthesis:** Alkaloids and tannins are known to interfere with bacterial protein synthesis by binding to enzymes or other essential proteins within the bacterial cells, preventing their function and disrupting growth.
- **Interference with Microbial DNA Replication:** Some of the compounds, such as flavonoids and phenolic acids, have been shown to interact with bacterial DNA, preventing replication and thus halting the proliferation of the microorganisms.

The results of the phytochemical screening indicated that both *Eragrostis tenella* and *Dinebra retroflexa* possess a variety of antimicrobial agents in both aqueous and alcoholic extracts.

Table No.1: details of the presence (+) or absence (−) of specific Phytochemical compounds in each extract.

Plant Name	Types of Extracts	Alkaloids	Flavonoids	Glycosides	Tannins	Saponins
Dinebra retroflexa	Aqueous	+	+	−	−	−
	Alcoholic	+	+	+	+	−
Eragrostis tenella	Aqueous	+	+	−	−	−
	Alcoholic	+	+	+	+	−

From the table, it is evident that both *Dinebra retroflexa* and *Eragrostis tenella* contain a variety of bioactive compounds, with alkaloids, flavonoids, and tannins being common to both species.

The presence of these compounds is highly indicative of the antimicrobial potential of the extracts, confirming their relevance in traditional medicinal use.

Zone of Inhibition:

The antimicrobial activity of *Eragrostis tenella* and *Dinebra retroflexa* was evaluated by measuring the zone of inhibition against two bacterial strains: *Streptococcus Bacillus* (Gram-positive) and *Escherichia coli* (Gram-negative) using the agar well diffusion method.

Table No.2 : Zone of Inhibition (mm) for *Eragrostis tenella* and *Dinebra retroflexa* Extracts

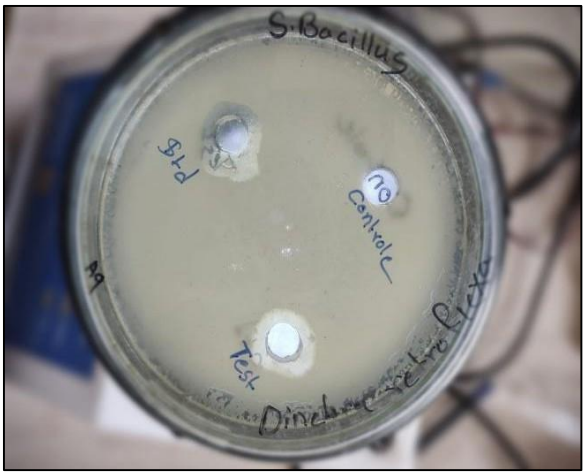
Sample	E. coli (mm)	S. Bacillus (mm)
Eragrostis tenella	6 mm	13 mm
Dinebra retroflexa	8 mm	10 mm
Standard (Amoxicillin)	13 mm	17 mm
Control	0 mm	0 mm

The results of the antimicrobial testing are as follows:

- **Eragrostis tenella:**
  - *Against Streptococcus Bacillus (Gram-positive)*: The extract of *Eragrostis tenella* exhibited a significant inhibition zone of 13 mm, demonstrating its effectiveness against *S. Bacillus*.
  - *Against Escherichia coli (Gram-negative)*: The inhibition zone was 6 mm, showing moderate antimicrobial activity against *E. coli*.
- **Dinebra retroflexa:**
  - *Against Streptococcus Bacillus (Gram-positive)*: The extract of *Dinebra retroflexa* demonstrated an inhibition zone of 10 mm, suggesting its antimicrobial activity against *S. Bacillus*, although less potent compared to *Eragrostis tenella*.
  - *Against Escherichia coli (Gram-negative)*: The extract exhibited a 8 mm zone of inhibition against *E. coli*, which was higher than that of *Eragrostis tenella* but still lower than that observed for *S. Bacillus*.
- **Standard antibiotic (Amoxicillin):**
  - *Against Streptococcus Bacillus (Gram-positive)*: The standard antibiotic Amoxicillin exhibited a 17 mm inhibition zone, indicating strong antibacterial activity against *S. Bacillus*.
  - *Against Escherichia coli (Gram-negative)*: The Amoxicillin produced a 13 mm inhibition zone, which was significantly larger than the zones observed for both plant extracts.
- **Control:**
  - The control (solvent) exhibited no inhibition zone, confirming that the observed antimicrobial activity was due to the plant extracts and not the solvent.

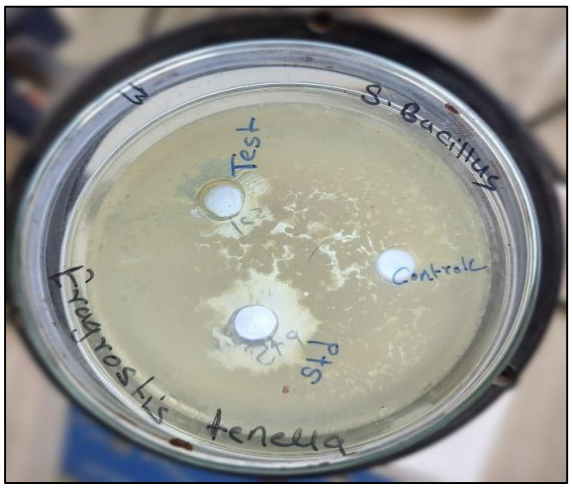
These findings highlight that both *Eragrostis tenella* and *Dinebra retroflexa* exhibited antimicrobial activity, with *Eragrostis tenella* showing the most potent activity against *S. Bacillus*. Although the inhibition zones for the plant extracts were smaller than the standard antibiotic, they still demonstrated notable antimicrobial potential.

Antimicrobial activity of ***D.retroflexa*** **against** ***E,coli***



Antimicrobial activity of ***D.retroflexa*** **against** ***S.Bacillus***

Fig No. 1: Antimicrobial activity of *Dinebra retroflexa* against *E. coli* and *S. Bacillus*.



Antimicrobial activity of *E.tenella* against *S. Bacillus*

Antimicrobial activity of E.tenella against E.colli

Fig No. 2: Antimicrobial activity of *Eragrostis tenella* against *E. coli* and *S. Bacillus*.

Comparative Susceptibility:

The antimicrobial susceptibility of the two bacterial strains was compared to assess how the Gram-positive and Gram-negative bacteria responded to the plant extracts.

- **Gram-positive bacteria (*S. Bacillus*):**

Gram-positive bacteria are generally more susceptible to antimicrobial agents due to the absence of an outer membrane, which allows for easier penetration of compounds into the bacterial cell. The results showed that *S. Bacillus* was highly susceptible to the plant extracts, with inhibition zones of 13 mm for *Eragrostis tenella* and 10 mm for *Dinebra retroflexa*. The inhibition zones were significantly larger than those observed for *E. coli*, which aligns with the known increased permeability of Gram-positive bacteria to antimicrobial compounds.

- **Gram-negative bacteria (*E. coli*):**

E. coli, being a Gram-negative bacterium, is inherently more resistant to antimicrobial agents due to its outer membrane, which acts as a barrier to many compounds. In this study, both *Eragrostis tenella* and *Dinebra retroflexa* showed less potent inhibition against *E. coli*, with inhibition zones of 6 mm and 8 mm, respectively. This finding is consistent with the reduced effectiveness of plant-derived antimicrobial agents against Gram-negative bacteria, as their outer membrane significantly hinders the penetration of antimicrobial compounds.

The antimicrobial activity of *Eragrostis tenella* was slightly superior to that of *Dinebra retroflexa*. *Eragrostis tenella* exhibited stronger activity against *S. Bacillus* (13 mm) compared to *Dinebra retroflexa* (10 mm). However, *Dinebra retroflexa* demonstrated slightly higher activity against *E. coli* (8 mm) compared to *Eragrostis tenella* (6 mm).

Although the inhibition zones produced by the plant extracts were smaller than those observed with the standard antibiotic (Amoxicillin), which showed 17 mm and 13 mm zones of inhibition against *S. Bacillus* and *E. coli*, respectively, the results still indicate that both plants possess noteworthy antimicrobial efficacy. This suggests that while the antimicrobial activity of these plants is not as potent as that of Amoxicillin, they still show considerable promise as natural alternatives to synthetic antibiotics, particularly in the context of combating antibiotic-resistant strains.

These findings support the traditional medicinal use of *Eragrostis tenella* and *Dinebra retroflexa* and suggest that both plants could serve as valuable sources for the development of natural antimicrobial agents. The next steps in research could involve isolating and characterizing the specific compounds responsible for the observed antimicrobial effects, as well as testing their efficacy in vivo and in clinical settings. The broader application of these plants in developing sustainable, plant-based treatments for microbial infections could provide a novel approach in the fight against antibiotic resistance.

DISCUSSION

This study aimed to evaluate the antimicrobial activity of *Eragrostis tenella* and *Dinebra retroflexa* extracts against two bacterial strains: *Streptococcus Bacillus* (Gram-positive) and *Escherichia coli* (Gram-negative). Both plant species were found to exhibit notable antimicrobial activity, although their efficacy was slightly lower compared to the standard

antibiotic, Amoxicillin. Despite this, the results suggest that these plants possess promising potential for use as natural antimicrobial agents, especially in light of the growing challenge of antibiotic resistance.

Phytochemical Composition and Antimicrobial Activity

The phytochemical screening conducted in this study identified a variety of bioactive compounds, including alkaloids, flavonoids, tannins, phenols, and saponins, in the ethanol and aqueous extracts of *Eragrostis tenella* and *Dinebra retroflexa*. These compounds are widely recognized for their antimicrobial properties and are believed to play a central role in the observed antibacterial effects.

- **Alkaloids**, found in both plant extracts, are known to disrupt microbial cell membranes, interfere with protein synthesis, and inhibit bacterial growth. These compounds have been shown to possess potent antimicrobial activity against a wide range of bacterial species.
- **Flavonoids**, another significant compound present in both plants, have antioxidant and antimicrobial properties. They are capable of interacting with microbial DNA and enzymes, inhibiting bacterial replication and protein synthesis.
- **Tannins** have astringent properties and can bind to proteins, disrupting bacterial cell function. The presence of tannins in both *Eragrostis tenella* and *Dinebra retroflexa* suggests that they contribute to the observed antimicrobial effects by interfering with microbial enzyme activities.
- **Saponins** and **phenolic compounds**, also detected in the extracts, are known to have surfactant properties, which can disrupt microbial cell membranes, leading to the leakage of cellular contents and cell death.

These bioactive compounds, working in synergy, are likely responsible for the antimicrobial activity observed in both plant extracts. Their ability to target various bacterial cell components (e.g., cell membrane, proteins, DNA) supports the hypothesis that these plants can serve as potential sources for natural antimicrobial agents. [27,28,29,30]

Antimicrobial Activity Against Gram-positive and Gram-negative Bacteria

The results showed that both *Eragrostis tenella* and *Dinebra retroflexa* demonstrated stronger antimicrobial activity against *S. Bacillus* (Gram-positive) than against *E. coli* (Gram-negative). This aligns with the known difference in the structural properties of Gram-positive and Gram-negative bacteria. Gram-positive bacteria have a thick peptidoglycan layer in their cell wall, which makes them more susceptible to antimicrobial agents that target cell wall synthesis and integrity. In contrast, Gram-negative bacteria possess a complex outer membrane that acts as a barrier, limiting the penetration of many antimicrobial compounds.

- **Against *Streptococcus Bacillus* (Gram-positive):**

Both plant extracts showed significant activity, with *Eragrostis tenella* exhibiting a larger inhibition zone (13 mm) compared to *Dinebra retroflexa* (10 mm). This suggests that *Eragrostis tenella* might contain a more potent combination of bioactive compounds that are

particularly effective against Gram-positive bacteria. These results are consistent with the greater permeability of Gram-positive bacteria to antimicrobial compounds.

- **Against *Escherichia coli* (Gram-negative):**

The inhibition zones for both extracts were smaller, with *Dinebra retroflexa* showing a zone of 8 mm and *Eragrostis tenella* a zone of 6 mm. The lower activity against *E. coli* is expected due to the presence of the outer membrane in Gram-negative bacteria, which limits the diffusion of antimicrobial agents. Nevertheless, the results still indicate that both plants have some degree of antimicrobial activity against Gram-negative bacteria, although their effectiveness is less pronounced compared to Gram-positive bacteria. [31,32,33]

Comparison with Standard Antibiotic (Amoxicillin)

Amoxicillin, the standard antibiotic used in this study, showed larger inhibition zones against both *S. Bacillus* and *E. coli* (17 mm and 13 mm, respectively). While the plant extracts demonstrated antimicrobial activity, they were not as potent as Amoxicillin, which is a broad-spectrum antibiotic widely used to treat various bacterial infections. The results underscore the challenge of developing plant-based antimicrobial agents that can match the efficacy of synthetic antibiotics, especially against resistant strains. However, the plant extracts still demonstrated activity that could complement or enhance the effects of traditional antibiotics, particularly in areas where antibiotic resistance is a growing concern. [34,35]

Implications of the Findings

While the inhibition zones produced by *Eragrostis tenella* and *Dinebra retroflexa* were smaller compared to the standard antibiotic, they still provide valuable insights into the potential of these plants as sources for natural antimicrobial agents. The presence of multiple bioactive compounds that exhibit synergistic antimicrobial effects suggests that these plants could play an important role in addressing the issue of antibiotic resistance. The use of plant-derived antimicrobial agents is particularly promising in regions where access to pharmaceutical antibiotics is limited, and the overuse of antibiotics has led to the rise of resistant strains.

Moreover, the lower efficacy against *E. coli* highlights the need for further research to isolate and characterize specific compounds from these plants that may be more effective against Gram-negative bacteria. By isolating and testing individual bioactive compounds, it may be possible to enhance their antimicrobial potency or develop formulations that can overcome the challenges posed by the outer membrane of Gram-negative bacteria.

CONCLUSION

This study successfully evaluated the antimicrobial activity of *Eragrostis tenella* and *Dinebra retroflexa* extracts against two bacterial strains, *Streptococcus Bacillus* (Gram-positive) and *Escherichia coli* (Gram-negative). The results revealed that both plants exhibited antimicrobial properties, with *Eragrostis tenella* showing superior activity against *S. Bacillus* compared to *Dinebra retroflexa*, and *Dinebra retroflexa* displaying slightly stronger activity against *E. coli*. Although the inhibition zones produced by the plant extracts were smaller than those observed

with the standard antibiotic, Amoxicillin, the plants still demonstrated notable antimicrobial efficacy, supporting their traditional medicinal use.

Phytochemical screening confirmed the presence of key bioactive compounds in both plant extracts, including alkaloids, flavonoids, tannins, and saponins. These compounds are well-documented for their antimicrobial effects, which likely contribute to the observed inhibition of bacterial growth. The results suggest that these bioactive compounds, acting in synergy, are responsible for the antimicrobial properties of the plants. Compounds such as flavonoids and alkaloids can disrupt microbial cell membranes, interfere with protein and enzyme synthesis, and even inhibit bacterial DNA replication, all of which are mechanisms that contribute to the antibacterial activity observed.

The findings from this study highlight the potential of *Eragrostis tenella* and *Dinebra retroflexa* as sources of natural antimicrobial agents, particularly against Gram-positive bacteria. While their activity against Gram-negative bacteria, like *E. coli*, was less pronounced, the results indicate that further exploration of these plants could yield promising candidates for combating antibiotic-resistant infections. The lower efficacy observed against *E. coli* emphasizes the need for additional research to isolate and identify the specific compounds responsible for antimicrobial activity, as well as to improve their effectiveness against more resistant bacterial strains.

Although the plant extracts were not as potent as the standard antibiotic Amoxicillin, their ability to inhibit bacterial growth underscores their potential as complementary therapies in the fight against antibiotic resistance. Given the increasing concern over multidrug-resistant pathogens, plant-based antimicrobial agents, such as those derived from *Eragrostis tenella* and *Dinebra retroflexa*, could offer a sustainable and valuable alternative to traditional antibiotics.

Future research should focus on isolating and characterizing the active compounds in these plants, conducting in vivo studies, and testing their efficacy against a wider range of bacterial strains, including multidrug-resistant pathogens. With further investigation, these plants could play an important role in developing new, effective antimicrobial therapies.

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