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Research Paper

To Study the Antibacterial Activity of Grape Seeds

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ABSTRACT

The strong polyphenolic content and related health advantages of grape seed extract (GSE), which is derived from Vitis vinifera are well- known1. GSE's antibacterial efficacy against Gram-positive (Bacillus subtilis) and Gram-negative (Escherichia coli) bacteria is assessed in this study utilizing the agar well diffusion method2. The extract showed 12 mm inhibition zones against both strains, indicating modest antibacterial activity3. In contrast to the typical antibiotic Metronidazole (25–26 mm zones), GSE exhibited less pronounced but nonetheless noteworthy inhibitory effects4. These results provide credence to GSE's possible application as a natural antibacterial.

INTRODUCTION

Natural products have shown great promise as substitutes in the battle against microbial diseases6. Numerous bioactive substances, such as proanthocyanidins and flavonoids, which have shown antibacterial properties, are present in grape seed extract (GSE)7. GSE's antibacterial activity, which is frequently ascribed to its capacity to damage microbial cell membranes and impede cellular processes, is the main focus of this investigation8.

Grape seed extract's high polyphenol content gives it notable antibacterial properties. These substances have the ability to break down bacterial cell membranes, stop the growth of bacteria, and lessen inflammation.

Research has demonstrated that GSE is a promising optin for creating natural antimicrobial medicine since it can efficiently target a variety of bacterial infections, including both Gram-positive and Gram negative bacteria9.

MATERIAL AND METHODS

The material is to gather grape seeds and monitor their activity.

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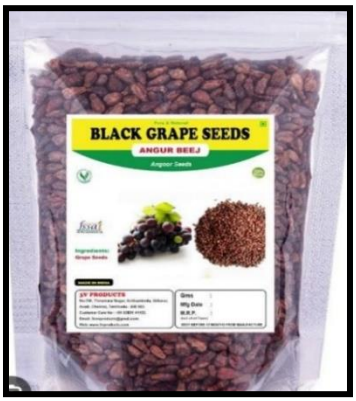

Fig No 1: Grape Seed

Fig No 2: Seeds

Biological Name: Vitis Vinifera
Common Name: Grape Wine, European Wine grape
Family: Vitaceae
Chemical constituents: minerals, monomers, dimers, trimers, oligomers, polymers, fiber (40%) & Oil (7-20%)10.
Uses:
1.Antibacterial and antiviral qualities.
2. Enhance eye health.
3. protect the skin and hair from harm.
4. Cancer protective11.

Materials:

1. Sample: Grape seeds.
2. Microorganism: ATCC6051 Bacillus Subtilis & ATCC 25922 Escherichia coli.
3. Nutrient agar (Hi Media) as the culture media12.
4. Dimethyl Sulfoxide (DMSO) is the solvent.
5. Positive Control: 1 mg per ml of Metronidazole.
6. DMSO is the negative control.
7. A Sterile cork borer and Petri plates.
8. Tools for inoculation: Spreading rod and micropipette.

Methods:

Procedure for Extraction:
1. Sample Preparation: Five grams of crushed grape seeds were put in a thimble.
2. The organic solvent utilized for the extraction process was 300 milliliters of methanol.
3. Equipment Configuration: Glass wool was used to insulate the side arm. After heating and evaporating, the solvent was condensed using a condenser
4. Extraction Cycle: The sample was in the thimble when the condensed methanol dripped into it. The siphon completed a cycle by returning the solvent to the flask once it had been filled.
5. Duration: The procedure ran for 8 hours straight.
6. Cycle Completion: The extract was gathered, allowed to air dry, and then stored for further use following seven cycle13.

Fig No. 3 Soxhlet Apparatus

Check to see if the grape seed is active:

1) The Well Diffusion Approach to Antimicrobial Activity
2) Antimicrobial Characteristics:
Activity: Well diffusion method-based antimicrobial activity.
Media: nutritional agar (Hi Media)

Procedure for the experiment Methods:

1. Making the inoculum: Utilising bacterial cultures, the inoculum was prepared. Clean, sanitize Petri dishes were filled with 15 ml of nutritional agar (Hi media), which was then left to cool and solidify.
2. Inoculation: A spreading stick was used to evenly distribute 100 microlitre of thre bacterial strain across the medium until it had completely dried.
3. Using a sterile cork borer, wells with a 6 mm diameter were created in order to add samples. In DMSO, test compounds (100 micro litre of 100 micro gram per ml) were made.
4. Each prepared test solutions (1 mg/ml) was applied to the wells in 100 micro litre, along with a standard solution. for a whole day, the plates were incubated at a 370C.
5. The positive control, metronidazole (1 mg/ml), was employed. As the negative control, DMSO was employed.
6. Measurement: To determine the antibacterial activity, the zone of inhibition (ZI) diameter was measured in millimeters. For precision, each test was conducted in triplicate14.

RESULT

The diffusion technique using agar wells was used to evaluate the antibacterial activity of grape seed extract against two bacterial strains: Gram-positive Bacillus subtilis and Gram-negative Escherichia coli. The results showed that the extract has antibacterial activity.1
The test compound's antibacterial activity against B. subtilis is shown in below table

Table no. 1

Sr. No	Samples	Zone in diameter (mm)
1	Control	00
2	Standard	25
3	Grape seed	12

Fig No. 1

Test compound's antibacterial activity against E. coli is shown in below table

Table no. 2

Sr. No	Samples	Zone in diameter (mm)
1	control	00
2	Standard	26
3	Grape seeds	12

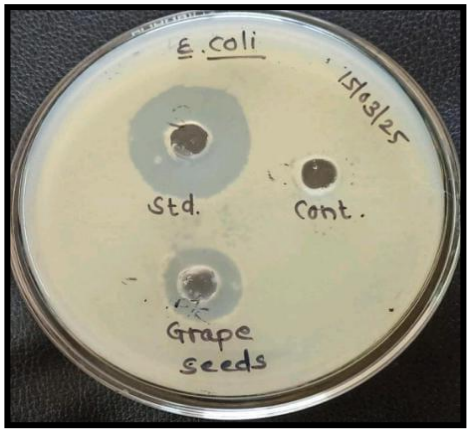

Fig No. 2

DISCUSSION

The extract from grape seeds showed inhibitory effects on both Gram-positive and Gram-negative bacteria. In Bacillus subtilis, the activity was more noticeable, confirming the idea that Gram-positive bacteria are more susceptible to polyphenolic chemicals because of their simpler cell wall structure. Proanthocyanidins, flavonoids, and tannins are probably responsible for this antibacterial action, which also involves the breakdown of microbial cell membranes and the inhibition of enzymes15.

CONCLUSION

According to the study, grape seed extract has a moderate antibacterial effect, especially against Bacillus subtilis. Despite being less effective than the common antibiotic metronidazole, GSE has potential as a natural antibacterial agent, particularly for use in complementary medicine or food preservation.

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Author contribution

Ekta Dudhal, Rutuja Kolekar, Suvasini Sukhsare: Conceptualization & Formulation
Anuja Patil: Experimental execution
Deepak Kare: Supervision and review.

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