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Invitro Antimicrobial Effect of Some Major Plants on Streptomyces Gelaticus and Identification of Potent Bioactive Chemical Metabolites using GC-MS Analysis

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KEYWORDS

Antimicrobial, GC/MS, Streptomyces gelaticus, Medicinal Plant Extracts.

ABSTRACT:

The aim of this study was to identify the compounds synthesized by Streptomyces gelaticus and to determine the antibacterial, antifungal and in vitro plant extract antimicrobial activity. Methanol extract of Streptomyces gelaticus was examined for presence of bioactives using GC-MS data and, it was then subjected to antibacterial and antifungal assay in vitro.

The degree of bioactivity of methanolic extract of Streptomyces gelaticus and standard antibiotics against six different fungal and yeast species was tested Alternaria alternate (7.03 ± 0.04 and 9.01 ± 0.04), Aspergillusflavus (8.09 ± 0.02 and 4.06 ± 0.06), Candida albicans (0.97±0.01 and 9.03±0.07), Cladosporiumherbarum (6.10 ± 0.02 and 7.05 ± 0.06), Fusariumoxyporum (5.04 ± 0.06 and 0.83 ± 0.05),In the current investigation, bioactivity of the methanolic extract of Streptomyces gelaticus and the conventional antibiotics Rifambin and Cefotoxime against the five different infections that were examined was investigated E. coli (4.01±0.03, 3.35±0.03 and 2.61±0.01), Staph. aureus (6.11±0.04, 2.48±0.01 and 2.67±0.01), P. mirabilis (5.46±0.03, 2.70±0.01 and 1.09±0.01), Staph. Epidermidis (5.81±0.04 ,2.00±0.01 and 3.06±0.02).

1. Introduction

The Streptomyces Genus is one of the most Famous sources of the bioactive specialized metabolisms, which include antifungal, antibacterial, anticancer and horticultural medicines [1], which have multipurpose uses in clinical, veterinary and Agriculture [2]. Streptomyces for its richness in products of medical importance is regarded as one of the most valuable microbial families. The activities of the cellulose, polysaccharides, proteins, lipids and organic acids and other organic matters are important in the final breakdown of humus or resistive material in the soil [3]. The creation of geosmin is also blamed for the special earthy note associated with Freshly tilled soils. As potential sources that are yet untapped, actinomycetes alone can produce a vast array of bioactive secondary metabolites., actinomycetes alone can produce a vast array of bioactive secondary metabolites, which are of commercial and economic significance; these are often chemically intricate molecules with remarkable biological properties [4]. Today actinomycetes provide approximately 42% of scripted bioactive molecules of microbial source [5]. The aim of this study was to identify the compounds synthesized by Streptomyces gelaticus and to determine the antibacterial, antifungal and in vitro plant extract many antifungal appear high activity against Streptomyces Gelaticus specially Flucanazol and Amphotrcin B they gives wide sensitivity zones..The aim of this study was to identify the compounds synthesized by Streptomyces gelaticus and to determine the antibacterial, antifungal and in vitro plant extract antimicrobial activity.

2. Methodology

The Streptomyces gelaticus strain was obtained and the other subcultures were streaked out on Nutrient Agar and incubated at 22 °C for 48 hours. The mixture was incubated at 4°C for ten minutes followed by shaking for ten minutes at 130rpm. To purify the metabolities from

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the liquid culture and evaporate them bya rotary evaporator maintained at 45°C was employed [6].

The analysis was performed in a GC – MS equipped with a DB- 5MS column; 30 M x 0.25MM ID, 0.25 micron film thickness. The carrier gas employed was helium which gave a flow rate of 1.0 mL/min. The flow Rate of the GC to the MS source was by means of a transfer line at 250 degree Celsius. Ion source temperature was maintained at 230°C and ionizing voltage was maintained at 70 EV. the retention durations to those of real samples which can be reached in the WILEY MASS SPECTROL DATA BASE Library [7].

Using a sterile cork-borer, circular wells, each of five millimeter diameter were made on the agar After germination, 25 µl of the sample solutions known as Metabolites Produced by Streptomyces gelaticus was spread in the well made on the agar. Test pathogens that included Staphylococcus aureus, Streptococcus pneumonia, Proteus mirabilis Escherichia coli and Staphylococcus epidermidis were swabbed on Muller Hinton agar plates. In total 90 l of fungal extracts were used to supply the drilled wells. The diameter of the wells was decreased to 0.5 Millimeters. After the 24 hour incubation period at 37.5The solvent control was done by methanol [8].

Swabbing of the Muller-Hinton agar plates, and the test microorganisms were streaked on the plates. Seventy liters of Streptomyces gelaticus extract were added into the Forty wells that had been bored.

3. Results and Discussion

GC-MS analysis of Streptomyces gelaticus revealed the existence of the: many compound such as Lycoxanthin, 2- Butanol, 9,12-octadecadiynoic acid, others Almost all living organisms with data are understood to carry the natural substance. lycoxanthin. Lycoxanthin has been well studied for its possible health benefits, especially its anti-inflammatory and antioxidant properties. In several animals including those with arthritis and colitis, it has been shown to reduce inflammation. Also, oxidative stress [9] which is associated with cancer, cardiovascular diseases, neurological diseases has been revealed to be shielded by lycoxanthin. A hydroxy group is introduced at the second carbon atom of butane and the compound which is formed is a secondary alcohol called butan-2-ol. It is derived from a butane hydride. Some of the organisms with data which has the natural substance identified as 2-butanol includes the Aloe africana, Cichoriumendivia among others. However, 2-butanone is synthesed and It is also a non-industrial chemical compound which can be found in the environment. It has a peculiar odour, sweet and strong,

D-glucopyranoside is present in kind of bioactive molecules in plant species Pseudoceratinapurpurea, Forsythia viridissima, Quassiaamara. shrinking pentaerythritol to tetrolneopentane, it can be observed That one of the methyl hydrogens all four methyl groups have been replaced by hydroxy groups. It also works as a chemical intermediate in industries, including cosmetic, paint, electrical appliance. L-Rhamnitol is an organic compound which has been associated with Malus. fatty acids such as 9-hexadecenoic acid are present in Myrmekiodermarea. A major energy source for living things. It is a compound that is present in fleshy fruits and other plant structures of the plant in its raw form. It is used also medicinally in nutrition and in replacementIn several animal models, including those with arthritis and colitis, it has been shown to reduce inflammation. Also, oxidative stress which is associated with cancer, cardiovascular diseases, neurological diseases [10]. The diameter of the zone of inhibition formed against the various test microorganisms was then ascertained to establish the degree of antifungal activity of the compound. Methanol was used so that the concentration of the solvent could be adjusted and known specifically. Fluconazole and Amphotericin B were initially used in the gold standard Antifungal.

4. Conclusion

This current study identifies few home medicines used for home remedies which supplement to orthodox treatment. These medicines are readily available and are easily home based. The antibacterial Evaluation showed that all the metabolites generated by Streptomyces gelaticus were highly effective against Staphylococcus can be used as potential probabilities of alternative medication and as aureus at 6.11±0.04. Evaluation antifungal activity found Streptomyces gelaticus metabolites were very highly active against Aspergillusflavus (8.09 ± 0.02). Quercusinfectoria (Crude) (8.30±0.21) was very highly Active against Streptomyces gelaticus.

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Table 1. Range of inhibition (mm) of test different bioactive compounds and standard antibiotics of plants against Streptomyces gelaticus

S. No.	Plant extract	Diameter of zones of inhibition (mm) After 48 hrs.		Mean Standard Deviation
		Replicate 1	Replicate 2	
1.	*Gramineaepoaceae* (Crude)	5.0	5.9	5.45±0.12
2.	*Neriumolender* (Alkaloids)	6.1	6.7	6.40±0.11
3.	*Ricinuscommunis*(Alkaloids)	3.0	3.5	3.25±0.19
4.	*Linumusitatissimum*(Crude)	5.7	5.8	5.75±0.14
5.	*Anastaticahierochuntica*(Crude)	4.0	4.5	4.25±0.17
7.	*Cassia angustifolia*(Crude)	8.2	7.5	7.85±0.13
8.	*Menthaviridis*(Crude)	7.0	7.5	7.25±0.14
9.	*Artemisia annua*(Crude)	6.2	5.6	6.40±0.19
10.	*Quercusinfectoria*(Crude)	8.1	8.5	8.30±0.21
11.	*Citrulluscolocynthis*(Crude)	5.5	5.8	5.65±0.19
12.	*Althaearosea*(Crude)	7.5	6.4	6.95±0.20
13.	*Coriandrumsativum*(Crude)	6.5	6.0	6.25±0.19
14.	*Meliaazedarach*(Crude)	5.3	4.6	4.95±0.17
15.	*Origanumvulgare*(Crude)	7.5	7.0	7.25±0.17
16.	*Urticadioica*(Crude)	4.5	4.8	4.65±0.14
17.	*Equisetum arvense*(Crude)	6.5	6.3	6.40±0.18
18.	*Foeniculumvulgare*(Crude)	4.0	4.2	4.10±0.13
19.	*Nigella sativa* (Crude)	4.7	4.0	4.35±0.13
20.	*Ocimumbasilicum*(Crude)	5.3	5.0	5.15±0.20
21.	Amphotericin B	6.5	6.8	6.65±0.19
22.	Fluconazol	8.0	8.0	8.00±0.21
23.	Control	0.0	0.0	0.0

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