

ANTIBACTERIAL ACTIVITY FOR BIOSURFACTANT PRODUCED BY *STREPTOMYCES* SPP. ISOLATED FROM SOIL SAMPLES

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ABSTRACT

Objective: The goal of the present study on isolation *Streptomyces* from soil samples with biosurfactant activity and antibacterial activity analysis.

Methods: (25) The soil samples were taken from Hilla city. (10) It is *Streptomyces* spp. They were identified. (4) *Streptomyces* spp. having the ability to hemolysis on blood agar that has the capacity to generate biosurfactants. *Streptomyces* spp. 8 displayed a high degree of activity by having a blood agar inhibition zone (25 mm).

Results: Antibacterial activity was evaluated for *Streptomyces* spp. 8 (*Staphylococcus aureus*, *Escherichia Coli*, and *Pseudomonas aeruginosa*). *Streptomyces* spp. 8 has greatest inhibition zone against *S. aureus* equal to 14 mm compared 12 mm against *E. coli* and 8 mm for *P. aeruginosa*. This *Streptomyces* spp. 8 characteristic was tested, it showed Gram positive with aerial mycelium gray in color on yeast malt extract agar. Negative for melanin produced on tyrosine broth medium, negative for H₂S output, and pigment development, it has for the use of mannitol sucrose, glucose, and fructose as carbon source and negative for xylose.

Conclusion: Isolated *Streptomyces* spp. having the potential to generate biosurfactants with antibacterial activity.

Keywords: *Streptomyces* spp., Biosurfactant, Antibacterial activity.

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INTRODUCTION

Actinomycetes are bacteria and its Gram positive with filament growth, it is aerobic and great occurring in nature [1,2]. It is able for secondary metabolite producing such as antifungal, antitumor materials, and antibiotic [2,3,4]. *Streptomyces* spp. with biosurfactant was isolated from Tamil Nadu, India, soil samples [5]. Biosurfactant is amphiphilic compound as secondary metabolite which produced by microorganism. The good biosurfactant features make it be replaced or added to synthetic surfactant that important for food, cosmetic, and drug industry and in environment usage [6]. It has two parts, polar moiety and a non-polar group. Hydrophilic group consists of mono, oligo, or polysaccharides, peptides or proteins and hydrophobic moiety usually contain saturated, unsaturated, and hydroxyl fatty acid or fatty alcohol [7]. There are varieties set of biomolecules, which having same features as synthetic surfactant [8]. Many biosurfactant features are chemically qualified to high- and low-molecular mass compounds, glycolipids and lipopeptides, as low-molecular mass biosurfactants, rhamnolipids, and surfactin as examples and proteins and lipoproteins as high-molecular mass [9]. There are many usages for biosurfactant such as bioremediation, washing of soil, and soil flushing [10]. The good features for microbial-derived surfactants having low toxicity and able to degrade and effective at high pH and temperature values [9]. This study was aimed to *Streptomyces* isolation having ability for biosurfactant production and measuring activity against test bacteria.

MATERIALS AND METHODS

Isolation and Characterization of *Streptomyces* spp.

Twenty-five Hilla city soil samples gathered, and Caco3 treating, oven drying (45°C for 1 h). Soil dilution plate technique was used for isolating of *Streptomyces* spp. Yeast malt extract agar media at pH equal to 7.2. with incubation at 30°C (10 days) [11]. Cultural characteristics for *Streptomyces* tested on YMD agar, include aerial mycelium, substrate

mycelium color, and production of pigment. Utilization for carbon sources was made [12,11].

Method for Biosurfactant detection

Biosurfactant producing isolates ability was tested by hemolytic activity presence on blood agar plate. The human blood (5%) was added to blood agar with and blood agar base. Blood agar base was sterilized by autoclave at 121°C for 15 min. Before pouring blood was added and allow to be solid. Streaking for isolates made on the blood agar and incubate at 28°C for 7 days. Clear zone was observed [13].

ACTIVITY OF BIOSURFACTANT OF *STREPTOMYCES* SPP. 8 AGAINST TEST PATHOGENS

Cup plate method was used for measuring antibacterial activity against *Staphylococcus aureus*, *Escherichia Coli*, and *Pseudomonas aeruginosa*. Plates incubated at 37°C. The inhibition zone records after 34 h [14].

RESULTS AND DISCUSSION

Isolation of *Streptomyces* spp.

(10) *Streptomyces* spp. isolate was detected from 25 soil samples. It is Gram positive, with gray aerial and yellow substrate mycelium, isolates were growth on yeast malt extract agar and the colonies were not raise on agar with earth odor. *Streptomyces* spp. are positive for Gram stain, filament bacteria and produce different compounds with having biologically active compounds such as hydrolytic enzymes, antibiotics, and enzyme inhibitors [15].

Detection on biosurfactant production isolates

Four isolates having ability for biosurfactant production by testing on blood agar provided by red blood cell. The isolates having red blood cell β -hemolysis inhibition zone, *Streptomyces* spp. (6) having higher inhibition zone 25 nm against *S. aureus* (Fig. 1). This results similar to [5] results, he found that the production of biosurfactant can confirm

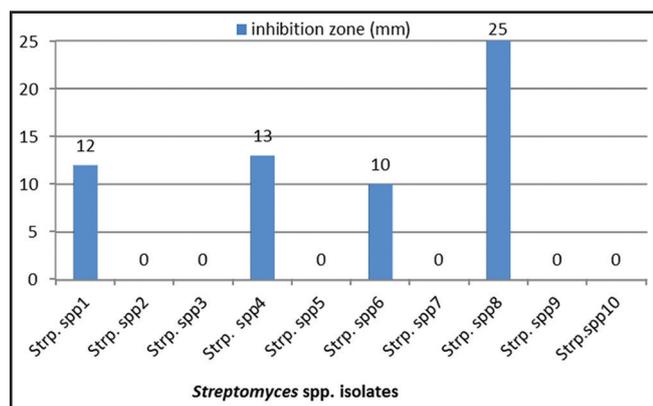


Fig. 1: Biosurfactant production by *Streptomyces* spp. isolates

Table 1: Antibacterial activity of *Streptomyces* spp. 8 against test pathogens

Bacterial test	Inhibition zone (mm)
<i>S. aureus</i>	14
<i>E. coli</i>	12
<i>P. aeruginosa</i>	8

Table 2: *Streptomyces* spp. 8 features

<i>Streptomyces</i> spp.	Results
Gram stain	+
Aerial mycelium	Gray
Substrate mycelium	Yellow-green
Production of H ₂ S	-
Pigment production	-
Melanin production	-
Sugar fermentation	-
Xylose	-
Mannitol	-
Sucrose	+
Glucose	+
Fructose	+

by testing of hemolysis on blood agar [16]. Hemolysis blood technique is a good way for biosurfactant producing microbes testing [17].

Antibacterial activity for *Streptomyces* spp. 8 biosurfactant producing

Antibacterial activity for *Streptomyces* spp. 8 was tested (*S. aureus*, *E. coli*, and *P. aeruginosa*). *Streptomyces* spp. 8 having greatest inhibition zone against *S. aureus* equal to 14 mm compared 12 mm against *E. coli* and 8 mm against *P. aeruginosa*. Producing of biosurfactant can be made by many bacteria, yeast, and fungi [18]. The antibacterial and antitumor activity having great usage which proved by (Table 1) [19,18].

Streptomyces spp. 8 characteristics

Streptomyces spp. 8 characteristics were tested, it showed Gram stain positive, and gray aerial mycelium on yeast malt extract agar. Negative for melanin producing on tyrosine broth medium. All *Streptomyces* spp. 8 features showed in Table 2.

CONCLUSION

The identified *Streptomyces* spp having the ability to hemolysis blood agar that has the capacity to generate biosurfactants. Antibacterial activity was evaluated for *Streptomyces* spp. against (*S. aureus*, *E. coli* and *P. aeruginosa*). *Streptomyces* spp. has greatest inhibition zone against

S. aureus equal to 14 mm compared 12 mm against *E. coli* and 8 mm for *Pseudomonas aeruginosa*.

AUTHOR'S CONTRIBUTIONS

The author declares that this entire work was done by the author named in this article.

CONFLICTS OF INTEREST

The author declares no conflicts of interest.

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