



RESEARCH ARTICLE

Microwave Synthesized Anthracene Derivative as Bioactive Agent

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ABSTRACT

The biological activities of anthracene derivative have been evaluated against, gram *positive and gram negative bacterial strain* by pathogen city tests. These tests were carried out by cup or agar well assay method. Compounds 1.4 and 1.5 against *B. subtilis* and 1.2 and 1.5 against *P. aeruginosa* were most effective tested compounds. Compound 1.1 and 1.4 showed excellent activity against *E. coli* comparable with that of the others.

KEYWORDS

Anthracene, Anthracene Derivative, Antibacterial Activity

INTRODUCTION

Polynuclear aromatic hydrocarbons occupy significant place in medicinal and pharmaceutical chemistry due to their diverse pharmacological properties. These results promoted us to evaluate antibacterial and antifungal biological efficacies of the synthesized compounds anthracenes, (anthracen-9-yl) methyamines and anthracene adducts.

Anthracene, one of the most important classes of organic and medicinal chemistry, has been considered to be pharmacologically very important nucleus, owing to the potent and broad spectrum activities of the several anthracene derivatives. Compounds having anthracene as basic moiety are widely distributed in nature exhibiting some interesting biological activities, such as antimicrobial¹, antibacterial²⁻⁷. The anthraquinone derivatives occupy a very important place among the different classes of anticancer agents.

The amino and hydroxyl derivatives of anthracene are considered to be pharmacologically useful.

MATERIAL AND METHODS

The antibacterial activity of all the synthesized compounds was carried out at Bryology and Biotechnology Research laboratory, Department of Botany, M. L. Sukhadia University, Udaipur (Raj.). Pure culture of pathogenic bacteria used for antibacterial activity, were procured from Microbial Type Culture Collection (MTCC) - Chandigarh INDIA.

Growth Medium

Nutrient agar medium was used for culture of the bacteria. The composition of nutrient agar medium was as follows:

| | |
|-----------------|---------|
| Beef extract | 3.0 gm |
| Peptone | 5.0 gm |
| Sodium chloride | 5.0 gm |
| Agar agar | 15.0 gm |
| Distilled water | 1000 ml |

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The antibacterial activity was assayed by using cup-plate agar diffusion method^{8,9} by measuring the zone of inhibition in mm.

Nutrient agar medium was sterilized by autoclaving at 15 psi and 121°C for 20 minutes. The medium was poured in petri dishes and left to solidify. These petri dishes were inoculated with 0.2 mL suspension of organism by spread plate method with the help of a sterile borer, wells were made in the medium and subsequently these well were filled with the concentration of 500 ppm/L (in DMF) of synthesized compounds. These petri dishes were incubated at 37°C. The petri dishes were examined for zone of inhibition after 48 hrs.

All the compounds were screened in vitro for their antibacterial activity against following strains of bacteria's.

- *Bacillus subtilis* (*B. subtilis*) from Gram-positive group of bacteria
- *Escherichia coli* (*E. coli*) from Gram-negative group of bacteria
- *Pseudomonas aeruginosa* (*P. aeruginosa*) from Gram-negative group of bacteria

Standard drug Streptomycin was used for the comparison purpose and DMF was used as a solvent for the compound and treated as control.

Table 1: Antibacterial screening result of synthesized compounds

| Zone of inhibition | | | | |
|--------------------|--|--------------------|----------------|----------------------|
| Code | Compd. No. | <i>B. subtilis</i> | <i>E. Coli</i> | <i>P. aeruginosa</i> |
| 1.1 | 9-(<i>N,N</i> -Dimethyl aminomethyl) anthracene | 25 | 28 | 21 |
| 1.2 | <i>N</i> -((Anthracene-9-yl) methyl) morpholine | 24 | 25 | 27 |

| | | | | |
|-----|--|----|----|----|
| 1.3 | <i>N</i> -((Anthracene-9-yl) methyl) pyrrolidine | 24 | 22 | 25 |
| 1.4 | <i>N</i> -((Anthracene-9-yl)methyl) piperidine | 28 | 28 | 26 |
| 1.5 | <i>N</i> -((Anthracene-9-yl) methyl) hexa methyleneimine | 28 | 28 | 27 |
| 1.6 | Streptomycin (STD) | 29 | 29 | 29 |

RESULTS AND DISCUSSION

The screening results of synthesized compounds have been summarized in Table 1. The screening data indicates that among the anthracene derivatives, the compound 3.1, 3.2, 3.4, 4.1, 4.2 and 4.3 were found to show moderate to excellent activity against the strains of bacteria used. Compounds 1.4, 1.5 showed good to excellent activity against the bacteria *B. subtilis* and *P. aeruginosa* whereas compounds 1.2 and 1.4, 1.5 showed moderate to good activity against the same bacteria. Compound 1.1 and 1.4 and 1.5 showed excellent activity against bacteria *E. coli*. Compounds 1.3 and 1.2 showed weak activity against *E. coli*.

Compounds 1.4 and 1.5 against *B. subtilis* and 1.2 and 1.5 against *P. aeruginosa* were most effective tested compounds. Compound 1.1 and 1.4 showed excellent activity against *E. coli* comparable with that of the others.

Antibacterial activity of these compounds may be attributed due to the presence of enone system and hydroxyl groups.

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