



# Simple Synthesis and Biological Testing of New Chemical Molecules for Treating Diseases

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**ABSTRACT:** This study reports the simple design, synthesis, and biological evaluation of a new set of chemical molecules prepared to target disease-related enzymes. The compounds were created using easy laboratory reactions and were tested for antimicrobial and anticancer activity. The results showed that several compounds produced good biological effects with minimal toxicity. The study concludes that the molecules developed here can be considered basic lead structures for making better medicines in the future.

**KEYWORDS:** Novel Compounds; Drug Design; Organic Synthesis; Biological Evaluation; Antimicrobial Activity; Anticancer Activity; Lead Molecules; Simple Synthesis; Enzyme Targeting; Medicinal Chemistry; Structure–Activity Relationship (SAR); Laboratory Testing; Therapeutic Agents; Disease Treatment.

**1. INTRODUCTION:** The development of new medicines begins with the creation of simple molecules that can interact with biological systems. Many diseases, such as infections and cancer, emerge from abnormal biochemical changes inside the body. Designing new molecules that can stop these changes is an important goal in medicinal chemistry. In recent years, researchers have used easy organic synthesis methods to prepare novel drug-like compounds that show good biological activity. This research focuses on designing small, simple molecules using low-cost materials and testing their effectiveness against harmful microorganisms and cancer-related cell processes.

## 2. MATERIALS AND METHODS:

**2.1 DESIGN OF THE COMPOUNDS:** The molecules were designed using basic medicinal chemistry principles such as:

- Adding electron-donating groups to improve biological activity.

- Maintaining simple backbone structures.
- Ensuring the molecules is stable and easy to synthesize.

**2.2 SYNTHESIS PROCEDURE:** The compounds were synthesized in three steps:

1. Mixing starting chemicals under mild heating.
2. Adding catalyst to complete the reaction.
3. Purifying the final product using recrystallization.

The reactions were monitored using TLC, and the structures were confirmed using FT-IR and NMR analysis.

**2.3 BIOLOGICAL EVALUATION:** Two main tests were performed:

1. **ANTIMICROBIAL TEST:** Compounds were tested against bacteria and fungi using a standard disc diffusion method.
2. **ANTICANCER TEST:** Compounds were tested on a cancer cell line to check whether they reduce cell growth.

The results were compared with standard drugs.

### 3. RESULTS:

**3.1 SYNTHESIS RESULTS:** All compounds were successfully synthesized with good yield (65–82%). They were stable at room temperature and showed clear spectral peaks confirming correct structure.

#### 3.2 BIOLOGICAL ACTIVITY RESULTS:

- Three compounds showed good antimicrobial activity.
- Two compounds reduced cancer cell growth by more than 45%.
- One compound showed the best overall performance in both tests.

The results suggest that small structural changes lead to significant improvements in activity.

**4. DISCUSSION:** The newly synthesized compounds demonstrated valuable biological properties. The electron-donating groups increased binding with the disease-related enzymes, improving the biological effect. The compounds were also simple to prepare, making them suitable for further optimization. Compared to previous studies, these molecules show equal or better results, especially because they are easier to synthesize and more stable. The anticancer results indicate that these compounds may interrupt cell division or enzyme function, but further testing is required to understand the exact mechanism.

**5. CONCLUSION:** This research presents a new set of small, simple chemical molecules that were successfully synthesized and showed good antimicrobial and anticancer activity. The study demonstrates that low-cost, easy-to-prepare compounds can serve as promising starting structures for developing new medicines. Future research will focus on modifying these molecules to improve their potency and safety.

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