Synthesis and antibacterial activity of new compound comprising butanolide and benzimidazole rings

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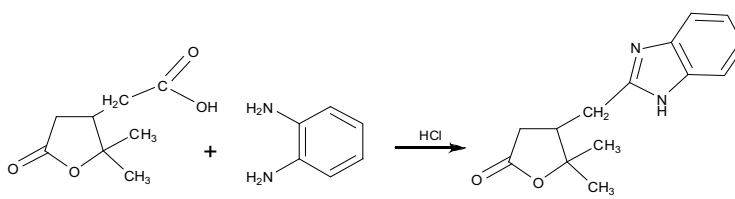
Saturated γ-lactones are an important class of heterocyclic compounds. They display a wide range of biological activities. These include Artemisinin and Santonin [1–2] and many compounds such as pilocarpine, a cholinergic drug [3-5].

The benzimidazole moiety is a significant pharmacophore [6]. Biological activities of benzimidazole derivatives include anticancer, antihypertensive, antibacterial, antifungal, antiparasitic, proton pump inhibitors, analgesic and anti-inflammatory agents [6,7].

Hence, the introduction into the saturated γ-lactones of benzimidazole ring may lead to an increase in basic or appearance of novel biological properties.



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We studied the condensation of 2-(2,2-dimethyl-5-oxotetrahydrofuran-3-yl) acetic acid (**1**) [8] with *o*-phenylenediamine (**2**) by simple and convenient method, which afforded a new compound comprising saturated γ-lactone and benzimidazole rings – 4-((1H-benzo[d]imidazol-2-yl)methyl)-5,5-dimethyldihydrofuran-2(3H)-one (**3**) with 86% yield. This approach has several benefits, for example low waste, easy work up, short reaction time and high yield. The structure of compound **3** was apparent from elemental analysis, IR, ^{1}H and ^{13}C NMR spectra.

Synthesized compound **3** was screened *in vitro* for its antibacterial activity against Gram-positive (Staphylococcus aureus – 209p, 1) and Gram-negative (Shigell Flexneri 6858, Esherichia coli 0–55) bacteria by the agar diffusion technique. The antibacterial activity of compound **3** was compared with standard drug furazolidone. The obtained compound exhibits defined antibacterial activity compared with the furazolidone against both Gram-positive and Gram-negative bacteria.

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