

Synthesis and Characterization of Alkyne Derivatives as Antifungal Agents



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Opinion

Alkyne derivatives play an important role in the pharmaceutical industry. Alkynes are organic hydrocarbons with at least one carbon-carbon triple bond such as acetylenyl and propargyl substituents and. Alkyne derivatives could be used as a molecular probe to study biological processes and corresponding diseases such as cancer and also find new therapy against the disease. To confirm the identity of the synthesized alkyne derivatives, the product was characterized by analytical methods. Antifungal activity of the new alkyne derivative could be evaluated by bioassay study of synthesized alkyne derivatives in vitro and in vivo environments. Thus, a deeper understanding of molecular phenomena in cellular process could be provided.

Synthesis and Characterization of Alkyne derivatives

Alkynyl groups are presented in some drugs such as antifungal agents. Haloprogin and terbinafine are common antifungal agents. Alkynes and alkynyl groups are classified as non-polar compounds and the smaller alkynes have gaseous state at room temperature. Alkynes have much higher boiling points than the corresponding alkanes. Alkynes were reduced with metal catalysts easily to provide alkanes [1]. Physicochemical and biological activity of a known compound could be varied by addition of the alkynyl group to the compound, so these compounds may be shown higher affinity at relevant targets such as receptor and enzyme.

Alkyne derivatives could be characterized by analytical methods such as FTIR, UV-vis, ¹H NMR, ¹³C NMR and elemental analysis. A series of acetylenic compounds such as propargyl acetate derivatives were synthesized and characterized by FTIR, ¹H NMR and ¹³C NMR spectroscopies and their anti-tubercular activities were evaluated in vitro environment and the obtained results showed that substitution of the alkyne group, had effects on the bioactivity [2].

To develop antifungal biomaterials such as starch derivative, azide-alkyne cycloaddition was used, and the novel starch derivatives were characterized by FTIR, ¹H NMR, ¹³C NMR, and elemental analysis. The obtained results showed the

enhancement of antifungal activity of the synthesized starch derivatives [3]. Also, azide-alkyne cycloaddition was used to synthesize chitosan derivatives to enhance antifungal activity of the synthesized chitosan derivatives. These synthetic strategies were used to prepare novel antifungal biomaterials and also cluster-alkyne complexes [4,5].

Applications

Glycidyl triazolyl polymer (GTP), which is the product of cycloaddition reaction between glycidyl azide polymer and alkyne derivatives, could be used to synthesize GTP-based polymer materials such as biomedical materials, self-healing and stimuli-responsive materials. Linear polyethylene glycol (PEG) molecules have the functional groups only at both ends, but GTP homopolymers and copolymers are multi functionalized PEG derivatives. The multifunctional polyethylene glycol derivatives, flexible polymers in terms of the branch structures, are easy to control and have wide applications.

However, azide alkyne cycloaddition reaction was used to synthesize antimicrobial peptide containing a carboxy amidated C-terminus (HSP1) and related physicochemical properties of the synthesized peptide such as DLS and Zeta potential were evaluated [6]. Increased fungicidal activity of the glycotriazole-peptides could be related to the presence of the triazole rings. Also, the catalytic activity of tricaticonic gold complex had been evaluated in the intramolecular hydroacylation of a terminal alkyne [7]. Previously, propargyl acetate derivatives and the synthesized compounds were evaluated for antitubercular activity [8] and minimum inhibitory concentration (MIC) of the drugs was evaluated [9,10].

Epilogue

There is essential need in organometallic chemistry to synthesize new compounds such as antifungal biomaterials and cluster-alkyne complexes, for example alkyne coordinated Iridium cluster, to use in pharmaceutical industries. In our point of view, synthesis and characterization of new alkyne derivatives as antifungal agents could be carried out qualitatively and

quantitatively by analytical methods such as UV-vis and ¹H NMR spectroscopies [11].

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