

Synthesis of Betulinic Acid-2-Hydroxybenzylidene Hydrazone

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Structured Abstract

Background: Betulinic acid is a naturally occurring pentacyclic triterpenoid that can be obtained from plant extraction, chemical synthesis, and biosynthesis. It is known for its broad pharmaceutical properties, including anticancer, anti-HIV, and anti-inflammatory activities. Hydrazone is an organic compound containing azomethine linkage which can be synthesized through condensation of aldehyde or ketones. Structural modification via hydrazone formation is intended to enhance the bioavailability and therapeutic efficacy of the compound, particularly for potential use as an anti-cancer agent.

Methods: This study focuses on the synthesis of betulinic acid-2-hydroxybenzylidene hydrazone, a derivative of betulinic acid where it involves a three-steps reaction, esterification of betulinic acid in diethyl ether under reflux employing diazomethane, reduction of betulinic acid ester with hydrazine in methanol under reflux for 6 hours, and finally, condensation reaction of betulinic acid hydrazide with the substituted aldehyde catalysed by glacial acetic acid in methanol under reflux, leading to the successful formation of the target hydrazone compound.

Results: The final product shows a successful synthesis of betulinic acid-2-hydroxybenzylidene hydrazone as the characterization of the final product was conducted using Nuclear Magnetic Resonance (NMR) spectroscopy and Fourier Transform Infrared (FTIR) spectroscopy, confirming the structure and assessing the purity of the synthesized product, giving a yield percentage of 33.33%. All product from the reactions, which are betulinic acid ester, betulinic acid hydrazide and betulinic acid hydrazone were obtained based on the ¹H NMR and ¹³C NMR spectrum.

Conclusion: In conclusion, the synthesis of hydrazone derivative of betulinic acid which is betulinic acid-2-hydroxybenzylidene hydrazone was finally achieved. Thus, the successful development of this derivative may offer valuable insights for further pharmacological research and drug development aimed at maximizing the therapeutic potential of betulinic acid-based compounds.

Keywords: Betulinic acid, hydrazone, esterification, derivative synthesis, spectroscopy

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