

# Pharmaceutical Science and Advanced Drug Delivery Systems

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## Isolation, structure elucidation and antimicrobial evaluation of natural pentacyclic triterpenoids and phytochemical investigation of different fractions of *Ziziphus spina-christi*

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Resistance to chemotherapeutic agents and adverse side effects of radiation are problems in clinical cancer treatment. Drugs inspired by natural products constitute many approved drugs for cancer as many as 247 drugs were approved from 1981 to 2019. Therefore, it is of interest to report the cytotoxic effects of *Z. Spina Christi* bark crude extract on human cell lines. *Z. Spina-Christi* possesses significant amounts of diverse phytochemicals, most importantly flavonoids, saponins, tannins, and triterpenes. The bark of *Z. Spina-Christi* has potent biological activities such as antinociceptive, antidiarrheal and antimicrobial activities. Previous reports revealed the biological importance of betulin as it showed adaptogenic, antioxidant, cytotoxic, anti-inflammatory, immune-modulator, and hypolipemic activities. Also, a combination of betulinic acid with anticancer drugs showed induction of apoptosis, caspases, and inhibition of the survival of clonogenic tumor cells. Betulinic acid exerts a plethora of pharmacological properties, especially as anti-inflammatory, antibacterial, and antiviral agents, in addition to its antidiabetic, antimalarial, anti-HIV, and antitumor properties. This study aimed to explore the antimicrobial activity of different fractions of *Z. Spina-Christi* (L.) stem bark, followed by bioassay-guided fractionation and isolation of the major bioactive compounds. Moreover, this study explores the metabolic pattern of different fractions of ZSC-L stem bark using LCHRMS. In the present work, different fractions of *Z. Spina-Christi* L. exhibited a varying degree of antimicrobial activity. Besides, LC-HR-MS analysis was used to identify metabolites of different fractions of *Z. Spina-Christi* L. The results revealed the presence and identification of 36

phytochemical compounds and biological studies carried out on the stem bark of *Z. Spina-Christi* L. Phytochemical investigations led to the isolation of two pure compounds, betulinic acid (C<sub>30</sub>H<sub>48</sub>O<sub>3</sub>) and betulin (C<sub>30</sub>H<sub>50</sub>O<sub>2</sub>). The structure of these compounds was determined by IR spectroscopy, mass spectroscopy, <sup>1</sup>H, and <sup>13</sup>C NMR and confirmed by comparing with the previously reported values. The molecular docking studies on betulinic acid and betulin against enzymes in various microorganisms revealed the potential binding affinity to the site of the appropriate targets. The n-butanol fractions of ZSC- L. have potent antimicrobial activity. Further investigation of the isolated metabolites is required to identify the bioactive compounds responsible for antimicrobial, antioxidant, and cytotoxic effects that may have potential in pharmaceutical and clinical applications.

### Speaker Biography

Essam Ads is currently an assistant professor at the forensic medicine institute, ministry of justice. He graduated with (an M.Sc. degree in Organic Chemistry-2001), (a Ph.D. degree in Applied Organic Chemistry-2009) - Department of Chemistry, Faculty of Science, Zagazig University, Egypt. From (2009-2019) Assistant professor of Organic chemistry-Faculty of Science, Hail University, KSA. His research interests focus on Applied Chemistry using the green procedure. Isolation of natural products from different plants is of medicinal importance using different chromatographic techniques and determining their structures using different spectroscopic techniques. To establish the biological activities of these plants and natural products. Also, syntheses of organic compounds using classical and solvent-free conditions (green Chemistry).

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