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Evaluation of Antioxidant and Anticancer Activity of Tinospora cordifolia against Ehrlich Ascites Carcinoma: In Vitro, in vivo and in silico Approach

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Abstract : Background: Globally, the burden of cancer is increasing consistently. Modern cancer therapies include lots of toxicity in the non-targeted organs reducing the life expectancy of the patients. Hence, scientists are trying to seek noble compounds from natural sources to treat cancer. Objectives: The objectives of the present study are to evaluate the phytochemicals, in vitro antioxidants, and in vivo and in silico anticancer study of various solvent fractions of Tinospora cordifolia (Willd.). Methodology: In this experiment, standard quantitative and qualitative assay methods were used to analyze the phytochemicals. The antioxidant activity was measured using the DPPH and ABTS scavenging methods. The in vivo antitumor activity is evaluated against Ehrlich ascites carcinoma (EAC) cell bearing in Swiss albino mice. In-silico ADME/T and molecular docking study were performed to assess the potential of stated phytochemicals against Transcription Factor STAT3b/DNA Complex of adenocarcinoma. Findings: Phytochemical screening confirmed the presence of flavonoids, alkaloids, glycosides, tannins, and carbohydrates. A significant amount of phenolic (20.19±0.3 mg/g GAE) and flavonoids (9.46±0.18 mg/g GAE) were found in methanolic extract in quantitative screening. Tinospora cordifolia methanolic extract showed promising DPPH and ABTS scavenging activity with the IC50 value of 1222.99 µg/mL and 1534.34 µg/mL, respectively, which was concentration dependent. In vivo anticancer activity in EAC cell-bearing mice showed significant ($P < 0.05$) percent inhibition of cell growth (60.12±1.22) was found at the highest dose compared with standard drug 5-Fluorouracil (81.18±1.28). Forty-two phytochemicals exhibit notable pharmacokinetics properties and passed drug-likeness screening tests in silico. In molecular docking study, (25S)-3Beta-acetoxy-5-alpha-22-beta-spirost-9(11)-en-12-beta-ol showed docking score (-8.5 kJ/mol) with significant non-bonding interactions with target enzyme. Conclusions: The results were found to be significant and confirmed that the methanolic extract of Tinospora cordifolia has remarkable antitumor activity with antioxidant potential. The Tinospora cordifolia methanolic extract may be considered a potent anticancer agent for advanced research.

Keywords : anticancer, antioxidant, Tinospora cordifolia, EAC cell
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