

Antioxidant and Anticancer Assessment and Phytochemical Investigation of Three Varieties of Date Fruits

Abstract:

Date palm (*Phoenix dactylifera* L.) fruits contain high concentrations of phenolic compounds, particularly flavonoids and other micronutrients, which impact human health due to their potent antioxidant, anti-inflammatory, and anticancer characteristics. In the present study, the effect of ethyl acetate, hydroethanol, hydromethanol, and aqueous extract from three date palm varieties (i.e., Ajwa, Siwi, and Sukkari) on phytochemical profiles and antioxidant and anticancer activities was investigated. Fruit extracts were screened for their antioxidant activity using the DPPH method. Phenolic constituents were quantified and identified using HPLC-DAD. Extracts (ethyl acetate, hydroethanol, and hydromethanol) were assessed for cytotoxicity on nine human cancer cell lines, i.e., MG-63, HCT116, MCF7, MDA-MB-231, HEPG2, HUH7, A549, H460, and HFB4, using the sulphorhodamine-B (SRB) assay. Results showed that the ethyl acetate extract of the Sukkari fruits has the greatest antioxidant potential with an IC_{50} value of $132.4 \pm 0.3 \mu\text{g}/\text{mL}^{-1}$, while the aqueous extract of Ajwa date fruits exhibited the lowest antioxidant effect with an IC_{50} value of $867.1 \pm 0.3 \mu\text{g}/\text{mL}^{-1}$. The extracts exhibited potent to moderate anticancer activities against the investigated cancer cell line in a source-dependent manner. Methanol extract of Siwi fruits exhibited the most potent anticancer activity ($IC_{50} = 99 \pm 1.6 \mu\text{g}/\text{mL}^{-1}$), followed by the same extract of Sukkari fruits with an IC_{50} value of $119 \pm 3.5 \mu\text{g}/\text{mL}^{-1}$ against the cell line of human breast cancer (MDA-MB-231). Additionally, principal component analysis (PCA) was investigated to determine the relationship among the investigated traits and treatments. Our findings reveal that date palm fruit-derived extracts are excellent sources of biologically active constituents and substantiate their potential use in new anticancer strategies from natural resources.