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BROAD-SPECTRUM CYTOTOXIC POTENTIAL OF *Zanthoxylum rhetsa* AGAINST VARIED CANCER CELL LINES

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The study of phytochemicals in medicinal plants is becoming popular due to their numerous pharmacologic effects. With their molecular level processes, natural compounds with anticancer properties can target reactive oxygen species signalling, induce apoptosis, reverse multidrug resistance, and produce anti-malignancy medicines. The objective of this study was to evaluate the broad-spectrum cytotoxic potential of four distinct extracts of plant parts of *Zanthoxylum rhetsa* (Indian prickly ash) against a variety of human cancer cell lines. The dried-plant powder of the leaf, bark, thorn, and bark-thorn was extracted using methanol. The cytotoxicity was determined against four cancer cell lines by the 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT) assay, and subsequently, the cancer cell colony formation ability was determined by clonogenic assay. The resulting IC_{50} values of all four extracts ranged from 0.006 ± 0.002 mg/mL to 0.014 ± 0.017 mg/mL against the RD sarcoma cell line, 0.004 ± 0.002 mg/mL to 0.014 ± 0.003 mg/mL against the DLD1 colon cancer cell line, 0.005 ± 0.001 mg/mL to 0.01 ± 0.004 mg/mL against the MCF7 breast cancer cell line, 0.018 ± 0.001 mg/mL to 0.035 ± 0.004 mg/mL against the HeLa cervical cancer cell line and 0.015 ± 0.004 mg/mL to 0.030 ± 0.009 mg/mL against the Vero cell line (non-cancerous). The colony-forming capacity of the extracts decreased with increasing IC_{50} concentrations. A remarkable inhibition of colony formation was observed with the thorn extract at $5 \times IC_{50}$ against the HeLa cell line with zero surviving cancer colonies. Similarly, the thorn extract showed potent cell toxicity against the RD cell line as well, with a low survival fraction of 9.9%. Previous studies have identified alkaloids, flavonoids, and phenolic compounds in *Z. rhetsa* as key contributors to its cytotoxic effects, potentially through apoptosis induction and tumour growth inhibition. These encouraging findings *in vitro* bolster the potential of *Z. rhetsa* as a natural source for the development of novel medicinal compounds against cancer.

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