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An *in vitro* Investigation of *Zanthoxylum rhetsa* (Thanahalu) and its Anti-cancer Potential Against MCF7 and DLD1 Cancer Cell Lines

MR Jayasinghe[1], KW Samarakoon[1] and AI Kuruppu[1#]

[1]Institute for Combinatorial Advanced Research and Education, General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka

[#]kuruppua@kdu.ac.lk

Abstract

Most medicinal plants presently employed in traditional medicine are used without much scientific evidence, this suggests a need to explore reliable investigations of their pharmaceutical potential. Therefore, in this research, we prepared methanolic extracts of the thorn, bark, leaf and also a mix of the bark and thorn of *Z. rhetsa*. We tested the anti-inflammatory, anti-oxidant and cytotoxicity of all the above-mentioned parts of this plant. The bark and thorn of this medicinal plant is mainly employed for the treatment and management of breast cancer in traditional medicine. A phytochemical analysis was conducted by Folin Ciocalteu's method: Total Phenolic Content (TPC) and aluminium chloride colorimetric method: Total Flavonoid Content (TFC). *In vitro* anti-inflammatory study was conducted by Human Red Blood Cell (HRBC) membrane stabilization assay, while the *in vitro* anti-oxidant study was performed by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. The cytotoxicity of the extracts was tested by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The phytochemical analysis revealed that the highest concentration tested (1 mg/ml) of *Z. rhetsa* bark showed the highest TPC value of 0.388 ± 0.003 mg/ml Gallic acid equivalent g. The bark and thorn extract showed the highest flavonoid content out of all extracts, 0.069 ± 0.001 mg/ml Quercetin equivalent g. The DPPH assay exhibited the highest inhibition of $72.927 \pm 0.293\%$ for the bark extract. The HRBC assay showed the highest anti-inflammatory activity for the thorn extract, $95.276 \pm 0.006\%$. The cytotoxicity effect of the highest concentration (1 mg/ml) tested showed an inhibition of $72.940 \pm 1.048\%$ for the bark and thorn extract against the MCF7 breast cancer cell line while a growth inhibition of $83.572 \pm 1.676\%$ was observed against the DLD1 colon cancer cell line by the leaf extract compared to control. These results indicate that the bark and thorn extract exhibited good cytotoxicity against the breast cancer cells which validates the use in traditional medicine. More experiments will be conducted to determine the anti-cancer activity of this extract in breast cancer cells.

Keywords: *Zanthoxylum rhetsa, Cytotoxicity, Breast cancer*