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Some insights on anticancer activity of saponins

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Saponins or triterpenoids are secondary metabolites that belong to a diverse group of surface-active glycosides of triterpene compounds with high chemoprevention potential. Dicotyledons (the flowering plants) are the richest source of triterpene saponins (roots, tubers, leaves and seeds). They exert anti-inflammatory, vasoprotective, gastroprotective and antimicrobial properties. They are also found to exhibit cytotoxic, cytostatic and pro-apoptotic effects against cancer cells when administered in vivo. A distinct pharmaceutical action of saponins is their capacity to conjoin and interact with biological membranes. The actions result in a temporary cell membrane reordering or its complete abolition. This is due to the pore formation in the cell membrane which holds all cellular materials together leading to disruption of ionic balance of the cells ultimately ensuing in cell death. Many saponins show anti-proliferative activity through an immediate effect on the cytoskeleton involved within the formation of the mitotic spindle and therefore the mechanism of action of those compounds varies depending on the type of saponin and the cell type exhibited to or as per the target of the molecule. Saponin isolated from dietary sources was shown to inhibit cellular carcinomic activity in low concentrations. Some saponins inhibited the expression of CDK (cyclin-dependent kinases) cells in cancer cells. Saponins may also affect cancer cell proliferation through the influence on signalling pathways involved in the regulation of cancer cells. They can particularly affect the expression of TNF (tumour necrosis factor) which leads to inhibition of cancer activity in cells. Saponins can activate both caspase-dependent and caspase-independent pro-apoptotic pathways resulting in the death of the cancerous cells. All these cellular mechanisms which are thoroughly researched indicate that saponins extracted from suitable plants can be utilised as potential therapeutic agents against cancer cells.

Keywords: Saponins, Cancer cells, Cytoskeleton, Cell membrane, Anti-proliferative activity, TNF

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