Diarylpentanoid (1,5-bis(4-hydroxy-3-methoxyphenyl)-1,4-pentadiene-3-one) (MS13) exhibits anti-proliferative, apoptosis induction and anti-migration properties on androgen-independent human prostate cancer by targeting cell cycle-apoptosis and PI3K signalling pathways

ABSTRACT

Diarylpentanoids exhibit a high degree of anti-cancer activity and stability in vitro over curcumin in prostate cancer cells. Hence, this study aims to investigate the effects of a diarylpentanoid, 1,5-bis(4-hydroxy-3-methoxyphenyl)-1,4-pentadiene-3-one (MS13) on cytotoxicity, anti-proliferative, apoptosis-inducing, anti-migration properties, and the underlying molecular mechanisms on treated androgen-independent prostate cancer cells, DU 145 and PC-3. A cell viability assay has shown greater cytotoxicity effects of MS13-treated DU 145 cells (EC50 7.57 ± 0.2 µM) and PC-3 cells (EC50 7.80 ± 0.7 µM) compared to curcumin (EC50: DU 145; 34.25 ± 2.7 µM and PC-3; 27.77 ± 6.4 µM). In addition, MS13 exhibited significant anti-proliferative activity against AIPC cells compared to curcumin in a dose- and time-dependent manner. Morphological observation, increased caspase-3 activity, and reduced Bcl-2 protein levels in these cells indicated that MS13 induces apoptosis in a time- and dose-dependent. Moreover, MS13 effectively inhibited the migration of DU 145 and PC-3 cells. Our results suggest that cell cycle-apoptosis and PI3K pathways were the topmost significant pathways impacted by MS13 activity. Our findings suggest that MS13 may demonstrate the anti-cancer activity by modulating DEGs associated with the cell cycle-apoptosis and PI3K pathways, thus inhibiting cell proliferation and cell migration as well as inducing apoptosis in AIPC cells.

Keyword: PI3K pathway; Androgen-independent prostate cancer; Anti-cancer; Anti-migration; Apoptosis; Cell cycle; Diarylpentanoid; Gene expression