

Cellular responses with thymoquinone treatment in human breast cancer cell line MCF-7

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ABSTRACT

Background Nigella sativa or black seed extract has been reported to show various medicinal benefits. Thymoquinone which is an active compound of its seed has been reported to contain anti-cancer properties. Objective The study addressed the anti-cancer efficiency of long-term in vitro treatment with thymoquinone towards human breast cancer cell lines MCF-7. Materials and Methods Cell proliferation was determined with CellTiter 96 Aqueous. Non-Radioactive Cell Proliferation Assay Kit. It was followed with trypan blue exclusion test to determine the percentage of viable cells. The study incorporated cell cycle assay to distinguish cell distribution at various cell cycle phases using Cycletest Plus DNA Reagent Kit. The apoptosis detection kit was used to determine the percentage of apoptotic and necrotic cells using flow cytometry. Results The 50% inhibitory concentration (IC₅₀) value determined using the proliferation assay was 25 mM thymoquinone. Late apoptotic cell percentage increased rapidly when treatment duration was increased to 24 h with 25 and 100 mM thymoquinone. Further analysis using cell cycle assay showed thymoquinone inhibition of breast cancer cell proliferation at minimal dose 25 mM and led to S phase arrest significantly at 72 h treatment ($p = 0.009$). It was also noted elevation sub-G₁ peak following treatment with 25 mM thymoquinone for 12 h. Increase in thymoquinone to 50 mM caused G₂ phase arrest at each time-point studied. Conclusion In general thymoquinone showed sustained inhibition of breast cancer cell proliferation with long-term treatment. Specificity of phase arrest was determined by thymoquinone dose.

KEYWORDS

Apoptosis . cytotoxicity . long-term exposure, MCF-7 cell line . thymoquinone

REFERENCES