

Apoptosis and cell cycle arrest of human colorectal cancer cell line HT-29 induced by vanillin.

ABSTRACT

Background: Vanillin is responsible for the flavor and smell of vanilla, a widely used flavoring agent. Previous studies showed that vanillin could enhance the repair of mutations and thus function as an anti-mutagen. However, its role in cancer, a disease that is closely related to mutation has not yet been fully elucidated. Methods: Hence, this study investigated the cytolytic and cytostatic properties of vanillin against HT-29, a human colorectal cancer cell line. Methods used including cell viability assay, acridine orange (AO)–ethidium bromide (EB) double staining cell morphological analysis, Cell cycle analysis, annexin V–propidium iodide apoptosis test and 5-bromo-2-deoxyuridine (BrdU)-labeling cell proliferation assay. Results: Results showed that apoptosis was induced by vanillin and the IC₅₀ for HT-29 and NIH/3T3 normal cell lines were 400 µg/ml and 1000 µg/ml, respectively. Different concentrations of vanillin arrest cell cycle at different checkpoints. 5-Bromo-2-deoxyuridine-labeling cell proliferation assay showed that G₀/G₁ arrest was achieved at lower concentration of vanillin (200 µg/ml) while cell cycle analysis by flow cytometer showed that G₂/M arrest occurs at higher concentration of vanillin (1000 µg/ml). Conclusion: Cytolytic and cytostatic effects shown by vanillin showed that it could be a useful colorectal cancer preventive agent. Further in vivo study should be carried out to confirm that similar effects could happen in animals.

Keyword: Cell viability; MTS assay; Cell morphology; Acridine orange–ethidium bromide; Cell cycle; Apoptosis; Annexin V–propidium iodide; 5-Bromo-2-deoxyuridine (BrdU); Anti-proliferation