THE EFFECTS OF CURCUMIN ON $\mathrm{H}_2\mathrm{O}_2$-INDUCED CELL DEATH IN THE HUMAN RETINAL PIGMENT EPITHELIAL CELLS

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ABSTRACT

Oxidative stress on retinal pigment epithelial cells (RPE) has been suggested as a cause of age-related macular degeneration (AMD), the leading cause of blindness among the elderly. Nevertheless, a number of studies have been expanded on counteracting oxidative damage contributing to AMD by dietary direct-acting antioxidants. It has been reported that curcumin, a polyphenolic compound found in Curcuma longa, exhibits strong antioxidant properties to scavenge the reactive oxygen species. Thus, this present study aimed to investigate if curcumin could prevent the hydrogen peroxide (H₂O₂)-induced RPE cell death and the possible mechanisms of protection were also studied. ARPE-19 cells were pretreated with curcumin at various concentrations, followed by expose to H₂O₂. The cell viability was determined by MTT assay. Nuclear morphology was examined by Hoechst 33342 staining. The expressions of apoptotic related proteins, caspase-3, Bax, Bcl-2, and anti-oxidant enzyme MnSOD were studied by Western blot analysis. The results demonstrated that H₂O₂ caused a significant decrease in cellular viability with an increase in the percentage of the number of cells containing nuclear condensed chromatin. Western blot analysis indicated that application of H₂O₂ on ARPE-19 cells caused the up-regulation of caspase-3, decrease of Bcl-2:Bax ratio and the down-regulation of MnSOD expression. Significant protection of H₂O₂-induced ARPE-19 cell death was obtained by pretreatment with curcumin at the concentration of 100 μM. Pretreated ARPE-19 cells with curcumin prior to H₂O₂ treatment could reverse the cytotoxicity of H₂O₂ and the nuclear chromatin condensed cell was not found. Moreover, Western blot analysis indicated that the pretreatment with curcumin, ARPE-19 cells could maintain the level of Bcl-2: Bax ratio and MnSOD expression which resulted in the cells survival. This study demonstrated that oxidative stress induced by H₂O₂ could lead to RPE cell death and can be prevented by curcumin. Thus, curcumin may serve as a potential agent in the treatment of AMD and other oxidative stress-associated degenerative diseases.

KEY WORDS: RETINAL PIGMENT EPITHELIAL CELLS/ AGE-RELATED MACULAR DEGENERATION/OXIDATIVE STRESS/ CURCUMIN

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