Cryptotanshinone attenuates in vitro oxLDL-induced pre-lesional atherosclerotic events.

ABSTRACT

Development of early stage atherosclerosis involves the activation of endothelial cells by oxidized low-density lipoprotein (oxLDL) with subsequent increases in endothelial permeability and expression of adhesion molecules favoring the adherence of monocytes to the endothelium. Cryptotanshinone (CTS), a major compound derived from the Chinese herb Salvia miltiorrhiza, is known for its protective effects against cardiovascular diseases. The aim of this study was to determine whether CTS could prevent the oxLDL-induced early atherosclerotic events. OxLDL (100 µg/mL) was used to increase endothelial permeability and induce monocyte-endothelial cell adhesion in human umbilical vein endothelial cells (HUVECs). Endothelial nitric oxide (NO) concentrations, a permeability-regulating molecule, and expressions of intercellular adhesion molecule-1 (ICAM-1) and vascular cell adhesion molecule-1 (VCAM-1) were measured. Results show that a) endothelial hyperpermeability was suppressed by 94% ($p < 0.005$), b) monocyte adhesion by 105% ($p < 0.01$), and c) ICAM-1 and VCAM-1 expressions by 90% ($p < 0.01$) and 150% ($p < 0.005$), respectively, when CTS was applied. In contrast, CTS increased NO levels by 129% ($p < 0.01$) and was found to be noncytotoxic in the concentrations between 1-10 µM. These findings indicate that CTS suppresses an increase in endothelial permeability, likely due to the restoration of NO bioavailability in endothelial cells. They also indicate that CTS may attenuate monocyte adhesion to endothelial cells through the inhibition of adhesion molecules' expression. Thus, CTS may play an important role in the prevention of early or pre-lesional stage of atherosclerosis.

Keyword: Cryptotanshinone; Oxidized low-density lipoprotein; Atherosclerosis.