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Investigation of the protective effect of peanut (*Arachis hypogaea*) phenolics against methylglyoxal-induced glucotoxicity

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Under diabetic conditions, persistently elevated plasma glucose levels accelerate the formation of advanced glycation end products (AGEs). The highly reactive dicarbonyl compound-methylglyoxal (MGO) is one of the major precursors of AGEs. MGO contributes to increasing the risk of diabetes complications including retinopathy, nephropathy and cardiomyopathy by inducing oxidative damage in multiple organs. Peanuts are rich in energy and nutrients as well as contain various polyphenolic antioxidants. Here, we report the pharmaceutical potential of phenolic compounds in peanuts (*Arachis hypogaea*) by assessing their protective effects against MGO-induced cytotoxicity. First, we established the most efficient extraction conditions for phenolic compounds using roasted peanuts and 80% methanol which were evaluated by the UHPLC-MSMS system. We found that peanut phenolic compounds were predominantly composed of *p*-coumaric acid, catechin and epicatechin. Next, we assessed the effects of peanut phenolics on AGE formation and breakage *in vitro* using bovine serum albumin (BSA)-MGO and GSA-GO (glyoxal) models. Peanut phenolics not only inhibited AGE formation but also enhanced the breakdown of preformed AGEs. We also observed that MGO-induced cell death and ROS production were suppressed by the treatment of peanut extracts. Interestingly, MGO-mediated phosphorylation of MAPKs including ERK, JNK and p38 was decreased by the pretreatment of peanut extracts in human umbilical vein endothelial cells (HUVECs). The pretreatment of peanut extracts also restored the levels of Bax, p53 and Bcl-2 in MGO-treated HUVECs. Taken together, phenolic compounds in peanuts may have the protective effect against MGO-induced glucotoxicity in human endothelial cells, probably via regulating the MAPK signaling pathway and apoptosis. Our study suggests the pharmaceutical potential of peanut phenolics for the treatment of glucotoxcity.

Biography

Minsun Jeong holds PhD degree in Genetics from Yale University, USA. She is currently a Research Professor in the College of Pharmacy at Gachon University, South Korea. She is interested in molecular mechanisms responsible for the development of diabetes complications.

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