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β-Caryophyllene inhibits high glucose-induced oxidative stress, inflammation and extracellular matrix accumulation in mesangial cells

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Abstract

β-Caryophyllene (BCP) is a bicyclic sesquiterpene compound that has anti-diabetic activity. However, the effect of BCP on diabetic nephropathy (DN) remains unclear. Here, we aimed to evaluate the potential role of BCP in high glucose (HG)-induced glomerular mesangial cells (MCs). MCs were maintained under HG condition to simulate DN in vitro. Our results showed that BCP inhibited HG-induced cell proliferation, ROS production and NADPH oxidase (NOX) 2/4 expression. BCP exhibited anti-inflammatory activity with decreased levels of TNF-α, IL-1β, IL-6 in HG-induced MCs. Moreover, BCP treatment suppressed the HG-induced secretion of fibronectin (FN) and collagen IV (Col IV) in MCs. Furthermore, BCP suppressed the NF-κB activation and enhanced the Nrf2 activation in HG-induced MCs. However, inhibition of Nrf2 attenuated the protective effects of BCP on HG-induced MCs, while inhibition of NF-κB enhanced the nephro-protective effects of BCP on MCs. In conclusion, these findings demonstrated that BCP executed protective effects on HG-induced MCs via regulating NF-κB and Nrf2 signaling pathways.

Keywords: Diabetic nephropathy (DN); Extracellular matrix (ECM); Glomerular mesangial cells (MCs); Oxidative stress; β-Caryophyllene.

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