

Icariin Improves Insulin Resistance and Lipid Metabolism in Dyslipidemic Rats

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Outline

1. Introduction
2. Icariin is a PPAR α Activator Inducing Lipid Metabolic Gene Expression in Mice
3. Icariin Attenuates High-cholesterol Diet Induced Atherosclerosis in Rats by Inhibition of Inflammatory Response and p38 MAPK Signaling Pathway
4. Interaction Between Leucine and Phosphodiesterase-5 Inhibition in Modulating Insulin Sensitivity and Lipid Metabolism
5. Conclusion

Abstract

In past few years, the development rate of obesity had been increasing in a constant rate. Obesity is known as one of the causes of many systemic and metabolic diseases. It is related to the development of Insulin Resistance which may lead to Type II Diabetes Mellitus, and also hyperlipidemia which may lead to heart diseases such as Atherosclerosis. Icariin, a flavonoid extracted from *Herba epimedii* is an effective substance to improve male reproductive system. Some studies show that Icariin is capable of regulating lipid metabolism through Peroxisome Proliferator-Activating Receptor alpha (PPAR α) pathway. Activating PPAR α increases fatty acid binding and transport into mitochondrial matrix for β -oxidation. As the result, the lipid concentration on blood plasma decreases. On the other hand, icariin improve high fat diet induced atherosclerosis. It is shown that administration of icariin decreases plasma lipid and cholesterol level, lowering pro-inflammatory cytokines Tumor Necrosis Factor alpha (TNF- α) and Interleukin-6 (IL-6) both concentration and gene expression. This means inflammation occurring in blood vessels are being attenuated. Histopathological result shows significant reduction of foam cells accumulated in blood vessels endothelial layer. As icariin also act as phosphodiesterase 5 inhibitor (PDE5I), it might activate SIRT1/AMPK pathway via Nitrite Oxide (NO) production. SIRT1/AMPK pathway is related to energy expenditures and mitochondrial biogenesis, while activation of this pathway may improve hyperglycemia, insulin resistance, and lipid metabolism. *In vitro* study shows that administration of PDE5I combined with Leucine (Leu) increase oxygen consumption, NO production, glucose utilization and improvement in insulin signaling pathway. While *in vivo* shows improvements in glucose tolerance of obese rats. Increased expression of fatty acid oxidation enzymes and decrease of lipogenesis related gene markers were observed. Inflammatory markers in liver were also significantly reduced. In conclusion, Icariin has the potential to lower blood lipid in dyslipidemic patients, and combining it with leucine may increase the its lipid-lowering effect. This may significantly reduce the risk of getting hyperlipidemia induced atherosclerosis.

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