Iron overload causes oxidative stress and impaired insulin signaling in AML-12 hepatocytes.

Dig Dis Sci. 2013;58(7):1899-908

More than 20% of the US population are affected by non-alcoholic fatty liver disease (NAFLD), a potentially serious condition, and insulin resistance (IR) and triglyceride accumulation in the liver (steatosis) are considered as the hallmarks of it.

However, a fraction of NAFLD patients develop non-alcoholic steatohepatitis (NASH), the advanced and progressive form of the disease, which further progresses to cirrhosis and liver failure or hepatocellular carcinoma.

It has been found that excess body iron can increase oxidative stress in the liver, thus resulting in the progression of NAFLD to NASH. Various pre-clinical and clinical studies have shown that iron-induced oxidative stress contributes directly to hepatic IR and NASH.

Objective:

To investigate NASH-related effects of iron overload in AML-12 mouse hepatocytes.

Study Design:

AML-12 cells, a non-neoplastic TGF-α overexpressing mouse cell line, was used in the study to evaluate the effect of Curcumin (Curcumin C3 Complex® insulin signaling via an oxidative stress-based mechanism and extent of iron-related injury was altered by elevated fatty acids.

Results:

Iron-induced ROS level and lipid peroxidation were decreased by 57% and 81%, respectively when cells were treated with Curcumin

Stress kinase activation in cells treated with both stearic acid and iron, and insulin response were found to be prevented upon treating with Curcumin

Similarly, Curcumin decreased phospho-activation of JNK caused by stearic acid and iron by 74%

Phosphoactivation of p38 caused by stearic acid and iron was reduced by Curcumin by 45%

Conclusion:

The present results demonstrated that Curcumin can be effective in preventing iron-induced oxidative stress in NAFLD.