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Anisochronous aerobic exercise improves glucose and lipid metabolism of obstructive jaundice by activating Akt signaling pathway

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Objective To observe the effect of moderate intensity and different interval aerobic exercise on hepatic injury and AKT signaling pathway induced by severe obstructive jaundice in mice.

Methods 40 male KM mice were randomly divided into 4 groups: sham operation (OJ) group, model (OM) group, 3-week exercise (ST) group and 6-week exercise (SU) group. Mice in OM group, ST group and SU group all adopted the orthotopic hanging choledochotomy method modified by this study group to construct the animal model of obstructive jaundice. The slope of group ST and group SU were 0% and the speed was 10m/min. After the above 6 weeks of intervention, HE staining was used to observe the morphological changes of hepatocytes. Methods of automatic biochemical analyzer test serum total bilirubin (TBIL), alanine aminotransferase (ALT), aspartate aminotransferase (AST), liver function and fasting plasma glucose (GLU), glycosylated hemoglobin (HbA1c), glycosylated serum protein (GSP), total cholesterol (TC), triglyceride (TG) and high-density lipoprotein cholesterol (HDL - C) of sugar, lipid metabolism and biochemical indexes such as detection; Immunohistochemical staining and qrt-pcr technology were used to observe the expression changes of AKT related molecules such as SREBP-1c, LDL-C, gsk-3 β , GCK and G6Pase in liver tissues.

Results HE staining showed that the liver cell cords of the normal group were orderly. In the model group, the hepatocytes of the rats were fibrosed in large amounts, which showed degeneration, necrosis and even disordered structure of hepatocytes. In the 3-week exercise group, a small number of hepatic cells were found with patchy necrosis, hepatic lobule structure was changed, and hepatic cords were not well arranged. There was no obvious tissue necrosis in the 6-week exercise group, the hepatic lobule structure was basically normal, and the liver cord was arranged in order. Serological results showed that the levels of TG, TC, LDL-C, HDL - C and GLU in the 6-week exercise group were significantly lower than those in the model group ($P < 0.01$), and the levels of TG and TC in the 3-week group were also significantly decreased ($P < 0.05$). In liver tissues, the mRNA and protein expression of related molecules of AKT pathway such as SREBP-1c, LDL-C, gsk-3 β , GCK and G6Pase were significantly decreased.

Conclusions Moderate intensity aerobic exercise can regulate glucose and lipid metabolism in mice with severe liver injury caused by obstructive jaundice. The underlying mechanism may be related to regulating the AKT pathway.