Effect of a High-Fat Diet and Cholesterol Levels on Depression-like Behavior in Mice

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https://doi.org/10.12982/CMUJNS.2018.0012

ABSTRACT

High-fat diets are a well-known risk factor for many diseases, but the correlation between consuming a high-fat diet, serum lipid levels and the severity of depression or depression-like behavior remains unclear. Therefore, this study aimed to determine the effect of a high-fat diet on depression-like behavior and determine the correlation between cholesterol levels and the severity of depressive-like behavior. Thirty-nine, adult, male, C57BL/6Mlac mice were either fed a high-fat (61% of calories from fat) or normal (11% of calories from fat) diet for 10 weeks. At the end of the experiment, serum cholesterol levels and depression-like behavior, as determined by the forced swimming and tail suspension tests, were compared between the mice fed normal (control) and high-fat diets. The mice fed the high-fat diet showed significantly higher total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglyceride levels, as well as significantly longer immobility times in the forced swimming test (but not the tail suspension test), compared to the control group; thus, we concluded that consuming a high-fat diet for 10 weeks increased serum cholesterol and triglyceride levels and produced depression-like behavior in mice. In the mice fed the high-fat diet, we found large positive correlations between both total cholesterol and HDL-C levels with immobility times during the forced swimming test, indicating a strong link between hyperlipidemia and depression-like behaviors in mice.

Keywords: High-fat diet, Depression-like behavior, Serum lipid level