Cannabinoids reduce pro-inflammatory cytokines in insulin-resistant and obese male Wistar rats.

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Type 2 Diabetes (T2D) is a metabolic disease which is predicted to be the 7th leading cause of death worldwide by 2030. T2D is characterized by insulin resistance, inflammation and obesity; it is accompanied by carbohydrate, lipid and protein metabolism dysfunction. Insulin resistance affects the peripheral tissues: adipose tissue, skeletal muscle tissue and liver. Adipose tissue secretes signaling molecules, known as cytokines, which may exert their roles in either an anti-inflammatory or pro-inflammatory way (leptin, tumour necrosis factor alpha, C-reactive protein and interleukin-6). During obesity, adipose tissue is invaded by macrophages which in turn release pro-inflammatory cytokines and promote pro-inflammatory cytokine secretion from adipocytes; resulting in obesity-associated low-grade inflammation.

Cannabinoids are terpenoids derived from the plant Cannabis sativa; and have been traditionally used as anti-inflammatory agents. This study investigated the effects of three concentrations of Cannabis Extract (tetrahydrocannabinol: 1.25 mg/kg; 2.5 mg/kg and 5 mg/kg) on the cytokine profile of diet-induced obese (high fat diet and high carbohydrate diet) and insulin resistant (high fat diet) male Wistar rats. Cytokine levels were determined using Preprotech ELISA kits and the immune function assessed by white blood cell counts. Results indicate that Cannabis Extract treatment (tetrahydrocannabinol: 1.25 mg/kg) ameliorates pro-inflammatory cytokine levels in diet-induced obese, but not insulin resistant Male Wistar rats; suggesting that Cannabis Extract (tetrahydrocannabinol: 1.25 mg/kg) may possess anti-inflammatory activities and may be used to ameliorate insulin resistance before the development of T2D. These anti-inflammatory effects are diet dependent, as Cannabis Extract only exhibited anti-inflammatory activities in diet-induced obese Male Wistar rats fed a high carbohydrate diet.