Mesenteric adipose tissue inflammatory profile of C57BL/6J mice in acute consumption of high-fat diet and flaxseed oil.

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Abstract

The western diet and sedentary lifestyle are among the biggest contributors to obesity development. Studies have shown that adipose tissue dysfunction may be one of the major determinants of metabolic deficiencies in obese individuals, especially visceral adipose tissue, such as the mesentery. Therefore, the present study aim to evaluate the high fat diet (HFD) and the diet with substitution of 10% of flaxseed (FS) influence after 3 days of consumption. Animals C57BL/6J, 4 weeks old, were used. After 3 days of treatment, it was observed that the HFD animals presented statistical difference in the total final weight, as well as in the food intake and in the adipose tissues final weight. On the other hand, animals FS showed lower caloric intake when compared to the HFD group. In conclusion, the replacement of saturated to polyunsaturated ($\omega 3$ source) fat in a short period is enough to alter physiological and metabolic parameters that imply a higher risk for cardiometabolic diseases.

Key words: *adipose tissue, omega-3, obesity.*

Introduction

The adipose tissue dysfunction as one of the most determinant in metabolic deficiency in obese individuals, so excess visceral adipose tissue accumulation and adipocyte hypertrophy may represent strong markers of cardio metabolic diseases.¹ In this way, Coffey and O'leary (2016) described the mesenteric as greatest visceral adiposity contributor and producer of C-reactive protein, once dysregulated has an important role in obesity.² Furthermore, the high fat diet induces intestinal inflammation, and consequently permeability dysfunction, which is strong related to mesentery dysfunction.³ In this way, the omega 3 benefits have been researched as prevention to obesity relate diseases, due to its immunomodulatory effect.⁴ Accordingly to the importance between the influence of the western diet and cardiometabolic diseases development, the present study aim evaluate inflammatory and fatty acids profile of mesenteric tissue after 3 days of consume.

Results and Discussion

C57BL6J (N=18), four weeks old, were distributed in three groups (N=6 each), maintained during 3 days under specific diets: control diet (CTL – 4% of fat from soy oil), High-fat diet (HFD – 35% of fat from lard), and High-fat diet with 10% of flaxseed oil (rich in $\omega 3$) in substitution of lard (FS – 25% from lard + 10% FS). We carried out measurements such as food intake, fasting glucose, body weight gain, metabolic and physiological parameters and lipidomics of adipose tissue.

Figure 1. Physiological parameters

Table 1. Lipidomics of epididymal

ID	CTL	HFD	FS
Σ Sat	26.05 $\pm$ 1.4	28.86 $\pm$ 1.27**	26.19 $\pm$ 0.81##
Σ Mono	34.74 $\pm$ 0.62	35.47 $\pm$ 0.70	35.27 $\pm$ 0.41
Σ Poli	37.01 $\pm$ 1.19	30.77 $\pm$ 1.60***	36.35 $\pm$ 0.49###
$\Sigma\omega$ -3	2.34 $\pm$ 0.17	1.94 $\pm$ 0.31*	6.04 $\pm$ 1.74###
$\Sigma\omega$ -6	34.25 $\pm$ 1.43	28.72 $\pm$ 1.33***	30.03 $\pm$ 1.78
ω -6: ω -3	14.64 $\pm$ 1.34	14.79 $\pm$ 2.06	4.98 $\pm$ 3.58###
Trans	2.30 $\pm$ 0.12	2.58 $\pm$ 0.24*	2.18 $\pm$ 0.12

*A significant difference was observed between CTL and HFD groups by Student's t-test ($P < 0.05$).

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Conclusions

The short period of high-fat diet consumption can acutely changes the total body weight, food intake and visceral adiposity, despite to it the glucose homeostasis does not change. In the other hand, flaxseed oil was able to gently protect against metabolic disturbances. More analyses should be done to clarify the pro- and antiinflammatory flaxseed properties and its incorporation into adipose tissues.

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