

## EFFECTS OF A SEED EXTRACT OF ERUCA SATIVA MILL. IN AN EXPERIMENTAL MODEL OF METABOLIC SYNDROME

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**Introduction:** Several studies demonstrated the positive effects of the sulfur compounds of Brassicaceae on chronic diseases. Noteworthy, Brassicaceae biosynthesize and store high levels of glucosinolates which, in turn, are converted into the corresponding isothiocyanates by myrosinase enzyme <sup>[1]</sup>. These compounds can induce the expression of lipolysis-related genes in white adipocytes and reduce the total cholesterol/HDL-cholesterol ratio, free fatty acid and adiponin levels <sup>[2]</sup>. Recently, the isothiocyanate functional group has been described as an effective hydrogen sulfide (H<sub>2</sub>S) releasing moiety <sup>[3]</sup>. Therefore, isothiocyanate derivatives are expected to be endowed with many protective effects typical of this gastrin transmitter on the cardiovascular system; indeed, these effects have been already demonstrated for some synthetic isothiocyanate compounds <sup>[4-6]</sup>. *Eruca sativa* Mill. (ES, Brassicaceae) is a potential candidate for the treatment of metabolic syndrome and cardiovascular diseases (CVDs), and glucosinolates, flavonoids and isothiocyanates are the major constituents. Therefore, this work aims to evaluate the activity of ES seeds extract against metabolic syndrome.

**Materials and methods:** Male BALB-C mice were fed for 10 weeks with standard (Std) diet, with High Fat (HF) diet, with Std diet enriched with an ES seed extract (Std + ES) or with HF diet enriched with the same extract (HF + ES). ES seed extract, titled in glucoerucin and glucoraphanin (400 μmol/g), was added at 0.75% p/p. At the end of the treatment, we measured waist circumference, weight, body mass index (BMI g/cm<sup>2</sup>), glycemia from caudal vein of each fasted mouse (24h) and we evaluated the lipid panel (cholesterol, HDL, LDL), glycated hemoglobin and insulin levels. Moreover, the abdominal white adipose tissue was collected, weighed and used for the analysis of citrate synthase, an index of the metabolic activity of the adipocytes and also for histological analysis by hematoxylin-eosin staining. Heart, liver, femur and brain were also collected from each mice.

**Results:** The HF diet significantly increased the BMI, the waist circumference, the adipose tissue and the body weight. The presence of ES extract in HF diet reduced significantly the BMI value and the weight increase. Moreover, ES extract in HF diet seemed to show a reduction trend of adipose tissue and waist circumference. The enzymatic activity of citrate synthase showed a significant reduction in the group fed with HF diet; the treatment with ES significantly increased the enzymatic activity bringing back to the values observed in the control group fed with the Std diet. Furthermore, preliminary histological data showed an increased number and a size reduction trend of the adipocytes in the group treated with the ES extract compared to the HF group. The analysis of the glycemic parameters demonstrated that feeding mice with HF diet did not produce an hyperglycemic condition. However, we observed that the presence of ES extract contributed to a marked reduction of glycemic values in animals treated with HF diet. Moreover, HF diet produced an increased trend of glycated hemoglobin (HbA1C) levels and the addition of the ES extract reduced them significantly. Finally, HF diet increased significantly total cholesterol levels and ES extract seemed to induce an interesting reduction trend of this parameter.

**Conclusions:** Preliminary results showed a significant reduction of BMI, weight increase, glycated hemoglobin levels and glycemia. Moreover, an increased number and a size reduction trend of the adipocytes and the significant increase of the enzymatic activity of citrate synthase showed an improvement of the metabolic ability of adipocytes suggesting a positive effect of ES seed extract against metabolic syndrome, with an interesting translational and nutraceutical value.

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