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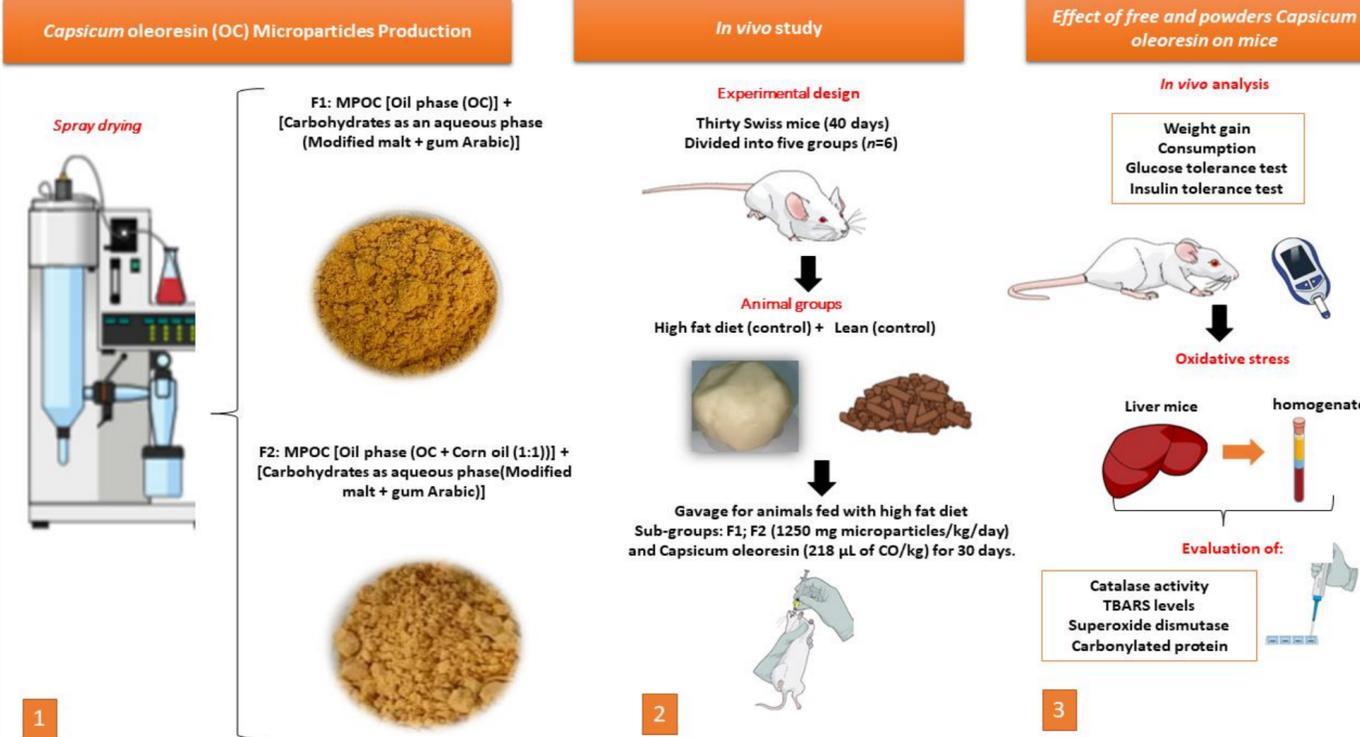
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Abstract

Capsicum oleoresin (CO) is high in compounds responsible for weight loss through the thermogenicity and has shown promising results for obesity treatment. Nonetheless, its application is limited due to its strong pungency and low bioaccessibility. With the purpose to overcome these drawbacks, Capsicum oleoresin microparticles were obtained by spray drying, and their effect on mice fed with a high-fat diet was investigated. At first, two emulsions containing 95% wall material (gum arabic and modified malt (50:50)) and 5% oil phase were atomized: one using only Capsicum oleoresin as oil phase (CO) and another containing CO plus corn oil (1:1, w/w), named Formulation 1 (F1) and Formulation 2 (F2), respectively. Thirty Swiss mice were divided into five groups (n= 6) where the lean control group received a commercial diet, and the other four groups received a high-fat (HF) diet for four weeks. The four HF groups were divided into HF control, HF + free Capsicum oleoresin (218 µL of CO/kg/day by gavage), HF + F1, and HF + F2 (both receiving 1250 mg microparticles/kg/day by gavage). The effects of the compound administration were assessed through diet consumption, weight gain, glucose tolerance test (GTT), insulin tolerance test (ITT), and oxidative stress parameters. Results showed a slightly higher consumption (4.53 g diet/per day) by the HF control group when compared to the group treated with F1 (3.75 g diet/day, p=0.05). After four weeks, treated groups (F1 and F2) gained the same weight as the lean group, pointing to a better effect of Capsicum oleoresin encapsulated than free oleoresin on weight gain. However, no effects on GTT and ITT were observed in animals treated with oleoresin, F1, and F2 microparticles, indicating no reversion of insulin resistance. In addition, although endogenous antioxidant enzymes were reduced in HF groups compared to the lean group, there were no significant differences among the groups. The protective effects of Capsicum oleoresin on obesity were not observed in the present study, maybe because of the doses or time used in the experimental protocol.

Materials and methods



Results

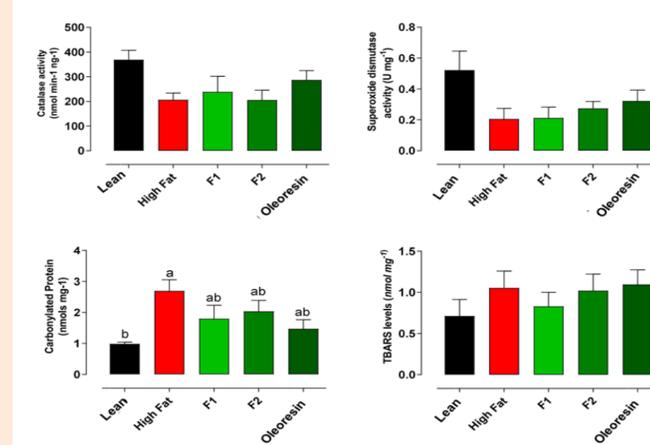


Fig 2. Oxidative stress parameters

Conclusion

In this study, animals fed with a HF diet presented a high level for oxidative stress except for the carbonylated protein parameter for treated groups, which was not significantly different from the lean group. Regarding gaining weight, we concluded that Group supplemented with F2 via oral gavage had a lower weight increase for four weeks receiving a high-fat diet. However, no positive impact on glucose and insulin tolerance was observed for treated groups. Based on all results, we concluded that the effect of Capsicum oleoresin on obesity was not observed in the main parameters investigated, perhaps because of time and doses employed in this experimental protocol.

Results

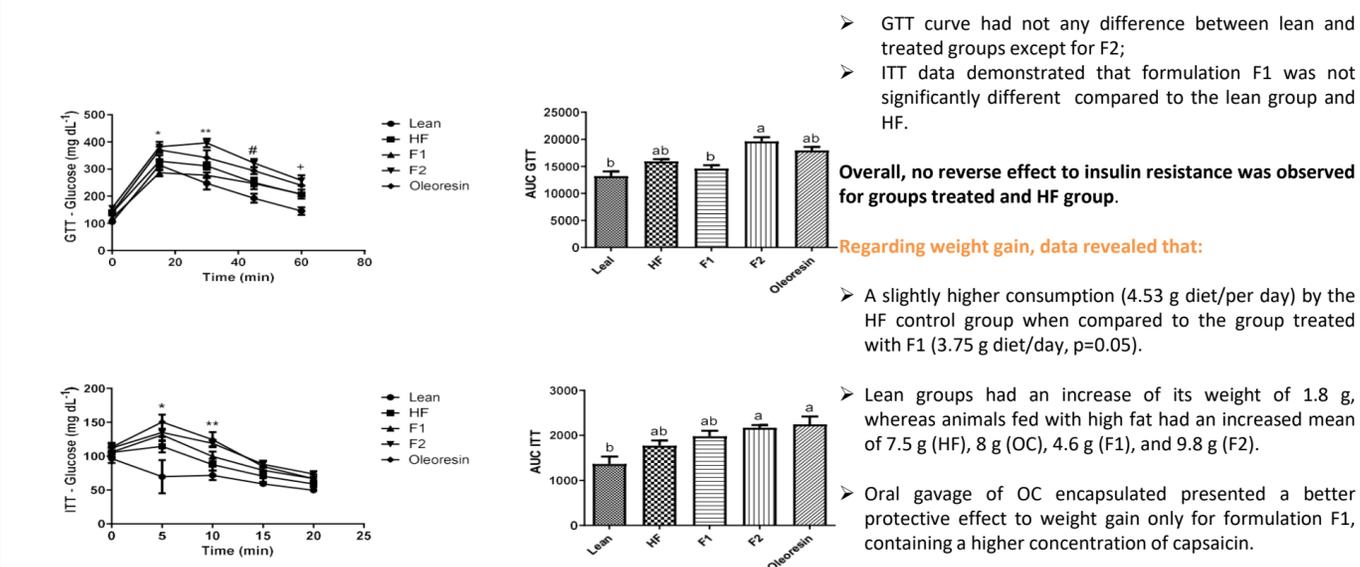


Fig 1. Curve of GTT and ITT

Results showed that:

- GTT curve had not any difference between lean and treated groups except for F2;
- ITT data demonstrated that formulation F1 was not significantly different compared to the lean group and HF.

Overall, no reverse effect to insulin resistance was observed for groups treated and HF group.

Regarding weight gain, data revealed that:

- A slightly higher consumption (4.53 g diet/per day) by the HF control group when compared to the group treated with F1 (3.75 g diet/day, p=0.05).
- Lean groups had an increase of its weight of 1.8 g, whereas animals fed with high fat had an increased mean of 7.5 g (HF), 8 g (OC), 4.6 g (F1), and 9.8 g (F2).
- Oral gavage of OC encapsulated presented a better protective effect to weight gain only for formulation F1, containing a higher concentration of capsaicin.

Introduction

Many compounds impact weight loss through the thermogenic effect. One such ingredient, Capsicum oleoresin, has shown promising results in the treatment of obesity related chronic diseases [1]: the intake of Capsicum oleoresin was related to reduction of adipose tissue and inflammation, by Lee et al. [2], and by Rogers [3]. Authors observed changes on multiple gene expression, activation of AMP-activated protein kinase and inhibition of glycerol-3-phosphate dehydrogenase in white adipose tissue.

Although few studies about the protective effect of Capsicum oleoresin in obesity, there is neither any certainty that microencapsulation by spray drying could modify its bioavailability and thus, impacts its biological response. Therefore, a preliminary study was carried out: Swiss mice, fed for 30 days on a high-fat (HF) diet supplemented with different microparticles formulation and Capsicum oleoresin by gavage were employed, in order to assess the effect of Capsicum oleoresin over glucose and insulin tolerance, liver damage, and weight gain.

Recommendations

1Adaszek, Ł., Gadomska, D., Mazurek, Ł., Łyp, P., Madany, J., & Winiarczyk, S. (2019). Properties of capsaicin and its utility in veterinary and human medicine. Research in Veterinary Science, 123, 14–19. <https://doi.org/10.1016/j.rvsc.2018.12.002>

2Lee, M.-S., Jung, S., Shin, Y., Lee, S., Kim, C.-T., Kim, I.-H., & Kim, Y. (2017). Lipolytic efficacy of alginate double-layer nanoemulsion containing oleoresin Capsicum in differentiated 3T3-L1 adipocytes. Food & Nutrition Research, 61, 1339553. doi:10.1080/16546628.2017.1339553

3Rogers, J., Urbina, S.L., Taylor, L.W. et al. (2018). Capsaicinoids supplementation decreases percent body fat and fat mass: adjustment using covariates in a post hoc analysis. BMC Obesity, 5, 1-10. <https://doi.org/10.1186/s40608-018-0197-1>

Acknowledgements

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