PRECONCEPTION SUPPLEMENTATION WITH LUTEIN CARRIER NANOPARTICLES PREVENTS DOPAMINERGIC AND BEHAVIORAL CHANGES IN FEMALE *Drosophila melanogaster*.

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INTRODUCTION**:** Maternal health during pregnancy is essential for fetal development and the future health of the child. Antioxidant compounds have emerged as a preventive strategy against neurodevelopmental disorders. OBJECTIVE: To investigate the effects of supplementation with lutein-loaded nanoparticles during the preconception period, using *Drosophila melanogaster* exposed to a neurodevelopmental disorder model as an experimental model. MATERIALS AND METHODS: Female flies were exposed for 24 hours to either a standard diet or a diet containing lutein-loaded nanoparticles (NPs LUT, 6 μM). After this period, the females were transferred to new experimental vials, and eighteen males were added, totaling 53 flies per experimental group. The males and females were then subdivided into two groups and exposed for 7 days to either a standard diet or imidacloprid (IMI) to induce the neurodevelopmental disorder model, resulting in four experimental groups: 1) Control (females pre-exposed to a standard diet + standard diet); 2) IMI (females pre-exposed to a standard diet + IMI 400 μM); 3) NPs LUT (females pre-exposed to lutein NPs 6 μM + standard diet); 4) NPs LUT + IMI (females pre-exposed to lutein NPs 6 μM + IMI 400 μM). After the exposure period, the hatched offspring were used for behavioral (social interaction, learning, and memory) and biochemical (tyrosine hydroxylase - TH and dopamine - DA) analyses. RESULTS: Exposure to IMI caused an increase in the distance between the flies, indicating social impairment, along with a reduction in the long-term learning and memory index, as well as a decrease in DA levels and TH enzyme activity in the flies subjected to the neurodevelopmental disorder model. However, preconception supplementation with NPs

LUT prevented alterations in social parameters, learning and memory indices, and prevented the reduction in TH activity and DA levels. CONCLUSION: Preconception supplementation with lutein-loaded nanoparticles exerted a neuroprotective effect, preventing behavioral and dopaminergic alterations in female *Drosophila melanogaster*, suggesting a promising strategy for future investigations.

Keywords: nanoparticles; neurodevelopmental disorders; bioactive compounds; dopaminergic system.
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