PROTECTIVE EFFECT OF MELATONIN AGAINST DAMAGE CAUSED BY CRYSTALLINE SILICA IN THE *CAENORHABDITIS ELEGANS* MODEL

Gabriela Endres da Rocha Pompeo[1]; Roberta Rodrigues Zorzo[1]; Mariana Arendt Schimitt[1]; Caroline Sperb[1]; Diulia Henrichsen[1]; Simone Gasparin Verza[1]; Magda Susana Perassolo[1]; Solange Cristina Garcia[2]; Mariele Feiffer Charao[1];

Universidade FEEVALE, Novo Hamburgo – RS

INTRODUCTION: Silica (SiO_2) is an abundant component of the Earth's crust, present in more than 95% of rocks. Human exposure occurs through inhalation. Respirable SiO_2 causes increased oxidative stress through the formation of reactive oxygen species (ROS). Due to its antioxidant power, melatonin is a substance with the potential to mitigate the effects caused by the generation of ROS. OBJECTIVE: The objective of this study was to evaluate the potential antioxidant effect of melatonin against the damage caused in the *C. elegans* model exposed to SiO_2. MATERIALS AND METHODS: Nematodes were chronically exposed to 5 concentrations of SiO_2 (62.5 µg/mL to 1,000 µg/mL in serial dilution) and toxicity endpoints (survival, body length and ROS production) were evaluated. Subsequently, experiments were performed with melatonin as pretreatment (3.125 µg/mL, 10 µg/mL and 50 µg/mL). RESULTS: There was a significant reduction in survival and body length ($p<0.0001$) in the last two concentrations of nematodes exposed to SiO_2. In addition, there was a significant increase in ROS production when compared to the control group ($p<0.0001$). To evaluate the effects of melatonin, the nematodes were pretreated for 1 hour with 3 concentrations of melatonin and were subsequently exposed to the highest concentration of SiO_2 (1,000 µg/mL) chronically. After 48 hours, the survival and body length of the nematodes were evaluated. The survival of the nematodes exposed to pretreatment was higher, demonstrating a significant difference ($p<0.005$) when compared to the silica group without pretreatment. The same was observed in body length ($p < 0.0001$). Furthermore, it was found that ROS production decreased significantly ($p < 0.05$) with the presence of melatonin as pretreatment to silica. To demonstrate the mechanism of action of melatonin in the nematode, we used the CF1553 strain (SOD-3:::GFP) and the TJ353 strain (DAF-16::::GFP). A significant increase ($p = 0.0004$) in the expression of the SOD enzyme was observed, as well as a significant nuclear migration of DAF-16 ($p < 0.0001$) with the increase in the melatonin concentration. CONCLUSION: melatonin protected the nematode from the damage caused by silica via DAF-16, being a potential antioxidant candidate for evaluating the beneficial effects of these substances in more complex models.

Keywords: Silica, melatonin, antioxidant, reactive oxygen species, *C. elegans*;

Funding source: FAPERGS and FEEVALE University.

[1] Bioanalysis Laboratory, FEEVALE University, Novo Hamburgo-RS, Brazil

[2] Federal University of Rio Grande do Sul (UFRGS), School of Pharmacy, Toxicology Laboratory (LATOX), Porto Alegre, RS, Brazil