INVESTIGATION OF CHANGES IN OXIDATIVE STRESS BIOMARKERS: CATALASE ACTIVITY AND METALLOTHIONEIN LEVELS IN THE LIVER OF RAINBOW TROUT (ONCORHYNCHUS MYKISS)AFTER EXPOSURE TO MICROPLASTIC PELLETS

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Microplastics (MPs) pollution is one of the primary environmental challenges nowadays, although MPs were observed in the ecosystem almost 50 years ago [1]. Understanding the environmental impact of microplastics is very challenging as MPs have different physicochemical properties that make MPs multifaceted stressors [2]. It is known that MPs can cause changes in immune-related gene expression, antioxidant enzymes as well as antioxidant status in fish [2, 3]. In ecotoxicological studies antioxidant enzymes, metallothioneins are often chosen as biomarkers of oxidative stress, which reflect the response to environmental changes in fish [4].

The aim of this study was to determine the changes in catalase (CAT) activity and metallothionein (MT) level in the liver of rainbow trout *(Oncorhynchus mykiss)* after long-term exposure to different types of polymeric microplastic pellets. In homogenized liver of fish MT levels were determined according to the method of Viarengo et al. (1997) as modified by Peixoto et al. (2003). Catalase activity was measured according to Koroliuk et al. (1988) and Hadwan and Abed (2016) methods.

The experiment results showed a significant decrease in CAT activity in *O. mykiss* liver after exposure to the low-density polyethylene (LDPE) compared to the control (CTRL) group. In LDPE group also showed a significant decrease in CAT activity compared to the high-density polyethylene and polystyrene (PS) groups. Metallothionein level significantly decreased after exposure to LDPE and PS microplastic compared to the CTRL group. Initial analysis showed that the different types of MPs pellets induce CAT activity and MT level changes in rainbow trout. For this reason, it is important to continue the studies on oxidative stress biomarkers with the goal to characterise the harmful effects of microplastics on fish.

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[1] M. Fiore, et al. Tackling Marine Microplastics Pollution: an Overview of Existing Solutions. Water Air Soil Pollut 233, 276 (2022)
[2] S. Yedier, S. K. Yalçınkaya, D. Bostancı, Exposure to polypropylene microplastics via diet and water induces oxidative stress in Cyprinus carpio. Aquatic Toxicology 259, 106540 (2023)
[3] Md. S. Bhuyan, Effects of Microplastics on Fish and in Human Health. Frontiers in Environmental Science 10, (2022)
[4] C. Campanale, C. Massarelli, I. Savino, V. Locaputo, ir V. F. Uricchio, A Detailed Review Study on Potential Effects of Microplastics and Additives of Concern on Human Health, Int J Environ Res Public Health (2020)