

Human gastrointestinal cells can be exposed to different xenobiotics present in food or drinking water. In this work, we assessed the cytotoxicity of polystyrene nanoparticles (PS-NPs) and how it is impacted by fluoride (F-) presence. We decided to examine PS-NPs and F- which can be found in drinking water and food. Amine-modified 100 nm PS-NPs were used and characterized by Scanning Electron Microscopy with Electron Dispersive Spectroscopy and Dynamic Light Scattering. The cytotoxicity of PS-NPs and F- alone or in co-exposure against colon cell (HT-29, Caco-2, CCD 841 CoN) was assessed by MTT assay. Flow cytometry was used to measure reactive oxygen species (ROS) production, cell cycle distribution, and apoptosis. Transmission Electron Microscopy was used to determine whether PS-NPs and/or F- can cause ultrastructure changes in the cells. We have shown that PS-NPs are cytotoxic to human colon cells in a time- and concentration-dependent manner. If HT-29 cells were co-exposed to PS-NPs and F-, an increased number of cells in G0/G1 phase and decreased number of cells in G2/M was observed. PS-NPs can cause apoptosis in HT-29 cells, this effect was enhanced if cells were co-exposed to PS-NP and F-. PS-NPs were internalised by the cells and caused ultrastructure changes. We have proven that polystyrene nanoparticles can be cytotoxic to human gastrointestinal cells and this effect is enhanced by fluoride. This work was funded by grant St-54 from Medical University of Gdansk.

Keywords: PS-NPs, co-exposure, nanotoxicology, microplastic, amino-modified polystyrene nanoparticles

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OCCURENCE OF MICROPLASTIC PARTICLES IN THE GASTROINTESTINAL TRACT OF FRESHWATER FISH SPECIES *Abramis brama* IN THE DANUBE RIVER, SERBIA

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Microplastic (MP) pollution has attracted wide attention since the production and use of plastic materials has increased worldwide. However, there is a lack of information about MPs in freshwater ecosystems, given that they are less studied compared to marine ones. Fish species are of special interest since they are utilized in the human diet. Among various sources, synthetic textiles play a dominant role in microplastic emissions, especially in the form of short fibers. The aim of this study was to determine the occurrence of MPs in the gastrointestinal tract (GIT) of the freshwater fish species common bream (*Abramis brama* Linnaeus, 1758) from the Danube River (1169 river km) in the area of the city of Belgrade, Serbia (44° 49' 54.48" N, 20° 27' 23.68" E). A total of nine specimens were collected, and the whole GIT was removed. Digestion of organic content was performed with a combined alkaline-oxidative treatment (10% KOH and Triton X-100; 30% H₂O₂). Filtered samples were visually observed under a binocular microscope. A total number of 136 plastic particles were detected, all belonging to a class of fibers. The size of the particles varied from 0.5 mm to 50 mm. The obtained results are in accordance with previous studies that reported fibers as the dominant shape of MPs in fish. The given results represent a contribution to the research of the MPs' occurrence in freshwater species. However, there is a need for further studies involving other fish species.

Keywords: Freshwater ecosystem, plastic fibers, common bream, intestine

POJAVA ČESTICA MIKROPLASTIKE U GASTROINTESTINALNOM TRAKTU SLATKOVODNE VRSTE RIBA *Abramis brama* U RIJECI DUNAV, SRBIJA

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Zagađenje mikroplastikom (MP) privuklo je široku pozornost budući da je proizvodnja i upotreba plastičnih materijala porasla diljem svijeta. Međutim, nedostaju podaci o MP u slatkovodnim ekosustavima, s obzirom na to da su oni manje proučavani u odnosu na morske. Riblje vrste su od posebnog interesa jer se koriste u ljudskoj prehrani. Među različitim izvorima, sintetički tekstil ima dominantnu ulogu u emisijama mikroplastike, posebno u obliku kratkih vlakana. Cilj ovog istraživanja bio je utvrditi pojavu MPs u gastrointestinalnom traktu (GIT) slatkovodne vrste riba deverika (*Abramis brama* Linnaeus, 1758) u Rijeci Dunav (1169 riječni kilometar) na području Beograda, Srbija (44° 49' 54.48" N, 20° 27' 23.68" E). Ukupno je prikupljeno devet uzoraka, a izvađen je cijeli GIT. Digestija organskog sadržaja provedena je kombiniranim alkalno-oksidativnim tretmanom (10% KOH i Triton X-100; 30% H₂O₂). Filtrirani uzorci vizualno su promatrani pod binokularnim mikroskopom. Otkriveno je ukupno 136 plastičnih čestica, koje sve pripadaju klasi vlakana. Veličina čestica varira od 0,5 mm do 50 mm. Dobiveni rezultati su u skladu s prijašnjim istraživanjima koja navode da su vlakna dominantni oblik MP-a u ribama. Navedeni rezultati predstavljaju doprinos istraživanju prisutnosti MPs u slatkovodnim vrstama. Međutim, postoji potreba za daljnjim studijama koje će uključivati i druge vrste riba.

Ključne riječi: slatkovodni ekosustav, plastična vlakna, deverika, probavilo

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PROCJENA TOKSIČNOSTI OTPADNIH VODA U KRŠKOM PODRUČJU PRIMJENOM TESTA INHIBICIJE RASTA ALGI

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Procjena toksičnosti provodi se akutnim testovima koji ukazuju na potencijalni toksični učinak na vodene organizme. Istraživanje toksičnosti vode rijeke Krke provedeno je u njezinom uzvodnom toku, koji je pod direktnim utjecajem neprikladno obrađenih industrijskih i komunalnih otpadnih voda, primjenom zelene alge (*Pseudokirchneriella subcapitata* (Korshikov) F. Hindák, 1990). Toksičnost vode u krškom području testirana je na pet postaja, izvoru rijeke Krke (KRS, referentna postaja), kod komunalnog ispusta (MWW), industrijskih otpadnih voda (IWW) te pritokama