

MERCURY ACCUMULATION AND SPECIATION IN RED MULLET (*MULLUS BARBATUS*) AND ANNULAR SEA BREAM (*DIPLODUS ANNULARIS*) FROM IZMIR BAY (EASTERN AEGEAN)

Tolga Gonul^{1*} and Filiz Kucuksezgin²
¹ Phd. student - tolga_8135@hotmail.com
² Prof. Dr.

Abstract

Total mercury (THg) and methylmercury (MeHg) concentrations were investigated in two different species from the Izmir Bay. The levels of THg and MeHg in fish tissue, ranging from 4.4 to 221.4 $\mu\text{g THg kg}^{-1}$ and 3.8-194.8 $\mu\text{g MeHg kg}^{-1}$ (wet wt.), varied according to sampling point and season. The results indicate that none of the fish analysed was $\geq 0.500 \mu\text{g g}^{-1}$ for THg and $\geq 0.300 \mu\text{g g}^{-1}$ for MeHg and nor did they exceed the WHO limit [1].

Keywords: *Mercury, Fishes, Aegean Sea*

Introduction

Izmir Bay, which covers a large range of industries, is one of the great natural bays of the Mediterranean. Few published data are present on total mercury concentrations in organisms from Izmir Bay, but no data are available on mercury speciation in organisms from Izmir Bay. The aim of this study is to comparatively evaluate THg and MeHg concentrations in two fish species collected from different sites of Izmir Bay. Methodology Fish samples were collected at four locations (Foca-Gediz, Uzunada, Gulbahce, Guzelbahce) in 2005 seasonally. THg concentrations were measured in VARIAN AAS by cold vapour technique [2]. The MeHg analysis in the freeze-dried tissue was made by GC-ECD [3].

Results and Discussion

Among the two species, THg and MeHg were examined (Table 1). The percentage of MeHg was high and constant in muscle. The mean percentages of MeHg to THg for all fish samples were $91.0 \pm 0.77\%$ (Mean \pm SE) with a range of 84–98%, indicating that organic mercury was the predominant form of mercury in the muscle tissue of fish (Table 1). The significant differences between sampling areas for THg and MeHg were not found in muscle tissue of *M. barbatus* and *D. Annularis* while concentrations in muscle tissue of *M. barbatus* and *D. Annularis* differed significantly among seasons for THg and MeHg.

Tab. 1. Range of THg, MeHg, inorganic Hg levels (mg kg^{-1} wet wt.), length (mm) and the ratios of MeHg to THg in biota in sampling areas

Sampling Area	Species	THg	MeHg	InorgHg	MeHg%
Foca-Gediz	<i>Mullus barbatus</i>	11.0-103	10.1-96.9	0.88-6.2	92-95
	<i>Diplodus annularis</i>	30.1-132	26.4-112	3.7-19.6	85-88
Gulbahce	<i>Mullus barbatus</i>	4.4-82.2	3.8-78.5	0.63-9.8	84-95
	<i>Diplodus annularis</i>	92.6-221	82.4-195	10.2-26.6	88-89
Uzunada	<i>Mullus barbatus</i>	20.3-158	17.8-148	2.5-18.1	87-95
	<i>Diplodus annularis</i>	23.1-157	21.9-154	1.2-11.5	90-98
Guzelbahce	<i>Mullus barbatus</i>	49.5	45.6	3.9	92
	<i>Diplodus annularis</i>	45.2	41.2	4.0	91

Conclusion

The maximum Hg content was $221.4 \mu\text{g THg kg}^{-1}$, corresponding to $194.82 \mu\text{g MeHg kg}^{-1}$ (wet wt.) in *D. Annularis*. For a person eating 200-250 g of *D. annularis* daily, the maximum amount of MeHg ingested is of 39-49 μg daily (273-343 μg weekly), a value of the same order of magnitude as the 210 μg permissible tolerable weekly intake (PTWI) for methylmercury proposed by USEPA [4]. Our results indicated that *D. annularis* exceeded this limit.

References

- 1 - WHO, 1990. World Health Organization. Environmental Health Criteria No. 101: Methylmercury. Geneva.
- 2 - UNEP, 1982. Reference Methods for Marine Pollution Studies, Vol.14.
- 3 - UNEP/FAO/IAEA/IOC, 1992. Determination of methylmercury in marine organisms. Reference Methods for Marine Pollution Studies, Ref. No.13, Rev.1.
- 4 - USEPA, 1984. Mercury Health Effects update: Health Issue Assessment: final Report. United States Environmental Protection Agency, Office of Health and Environmental Assessment, EPA 600/884 019F.