

Are Portuguese women of childbearing age exposed to environmental mercury? The One Health perspective

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Background

One health, a transdisciplinary approach, recognizes the **interconnection between human, animals and their shared environment**. **Fish and seafood** are important sources of high-biological value proteins, omega-3 fatty acids and essential minerals. However, it can contain **environmental contaminants**, such as **mercury** compounds, which undergo bioaccumulation in the aquatic food chain. Long-lived predatory fish species, such as tuna or scabbardfish, are an important human exposure source. Thus, only through a transdisciplinary approach, namely using one health perspective is possible to properly tackle the issue of mercury, at the different levels.

Methylmercury, the most toxic mercury form, mainly targets the central nervous system and the prenatal period represents a period of greatest vulnerability regarding neurodevelopmental effects on the fetus. **Portugal** has a tradition of **high consumption of fishery and aquaculture products**, higher than in the European Union (EU) countries and above both EU and world averages. **Human biomonitoring (HBM)** allows direct assessment of human exposure to chemical compounds.

Aims

- to evaluate the exposure of Portuguese women of childbearing age to mercury through human biomonitoring
- to determine mercury contamination in fish available in the Portuguese markets

Methods

For this study, 300 Portuguese women of childbearing age (25 to 44 years) were randomly selected among the participants in a cross-sectional epidemiological study carried out in Portugal (INSEF, <http://www.insef.pt/>). Also, a total of 24 different species of fish and fishery and aquaculture products acquired on the Portuguese market and representative of Portuguese consumption were selected. Total mercury (THg) content was determined in whole blood and fish samples by thermal decomposition and amalgamation atomic absorption spectrophotometry (TDA/AAS).

Results

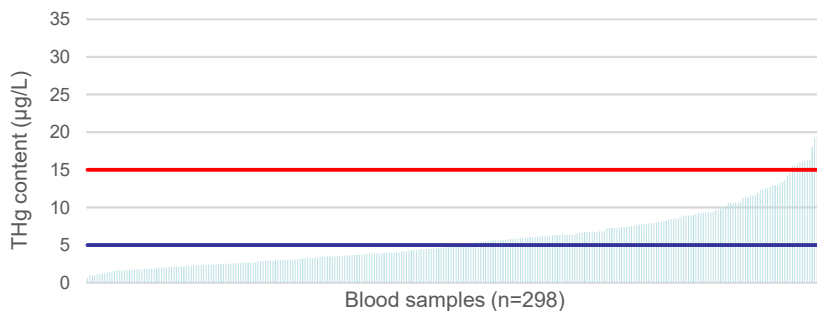


Fig. 1 – THg content in blood samples of INSEF participants. Only samples with results above the quantification limit (LoQ) were represented in the graph (n=298). Two lines were set according to German Human Biomonitoring Commission HBM Hg reference levels (Schulz, 2007).

Blood samples

- mean value (THg) = 5.9 ± 4.2 µg/L
- 99% values range 0.6 - 32.0 µg/L
- two samples < LoQ (0.5 µg/L)
- 48% revealed levels > 5.0 µg/L and therefore presented risk of adverse health effects

Fish samples

- All the samples presented mercury THg > LoQ (1.1 µg/kg)
- All the results within the legislated limit (Reg. EU 2022/617)
- Minimum - 4.2 µg/Kg (catfish)
- Maximum - 574 µg/Kg (scabbardfish)

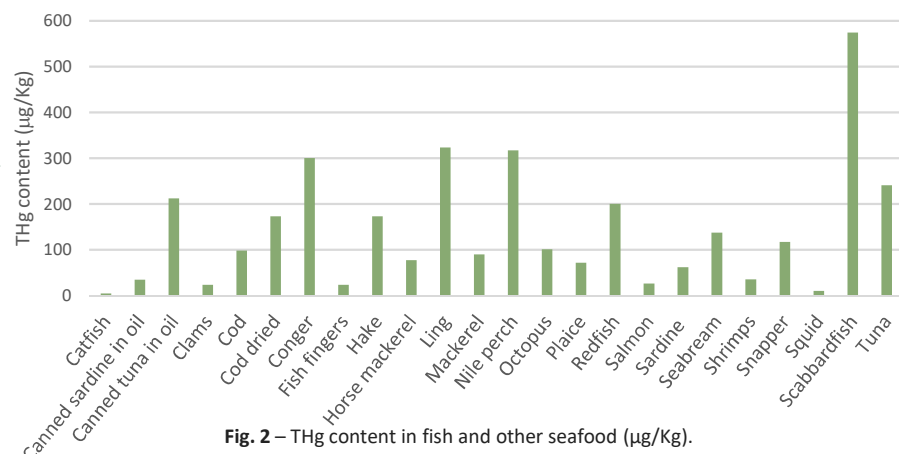


Fig. 2 – THg content in fish and other seafood (µg/Kg).

Conclusion

This study reinforces the need to develop and implement in Portugal **risk communication strategies** focused on the **selection of fish species with lower mercury levels**, in order to protect susceptible populations from exposure to this chemical, while simultaneously **promoting the important health benefits associated with fish consumption**, and applying a One Health approach.