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## One Health: the Interface between Fish and Human Health

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### Article History

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The Black Sea is a unique sea with its characteristics and is Turkey's most important sea. The Black Sea is like a large laboratory and is one of the most interesting seas of the world both in scientific and non-scientific aspects. Although Turkey is surrounded by sea on three sides, the fisheries activities are carried out in mostly the Black Sea. Risks to the Black Sea biodiversity are the entrance of alien species, commercial fisheries and overutilization of resources, contaminants especially heavy metals and pollution from industry, agriculture, sewage and touristic activities. These contaminants disturb the natural balance and extremely threaten it. Many of them are used in industry and drained to marine coastal environment as waste. Fast population growth and industrial developments of the last four decades have increased in the coastal cities of the Black Sea. These contaminants can also infect seafoods especially fish and finally people via consumption of these fish. Rising in the amounts of contaminants in the marine coastal ecosystems may outcome a rise in the concentrations of metal taken up and hereby accumulated by fish (Bat 2017).


Fish is among the healthiest foods on the world. Fish are very useful nutrients such as protein and vitamin D for humans. Fish is also a major source of omega-3 fatty acids, which are incredibly prominent for human body and brain. Consumption of fish can reduce the risk of heart attacks and strokes, boost brain health, improve sleep quality, protect vision in old age, reduce risk of autoimmune diseases, help prevent and treat depression. It is also crucial during development of child and may help prevent asthma in children. It is therefore recommended that adult persons consume at least two servings of fish per week. This ratio is reported to be three or four servings per week during pregnancy which has been linked to better functional outcomes of neurodevelopment in children if compared with consume no fish. This kind of quantities have also been corresponding with a lower risk of coronary heart disease mortality in adults. No extra benefits on neurodevelopmental consequences and no benefit on coronary heart disease mortality risk might be expected at larger intakes. The welfare benefits of fish eating in declining the risk of coronary heart

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disease mortality are likely due to the content of n-3 LCPUFA in fish (EFSA, 2015). The Turkish Statistical Institute reported that the average amount of fish consumed per capita between 2000 and 2018 was 5.5 to 8.6 kg per year (TUIK, 2018). However, this amount is higher in people living in the cities on the Black Sea coast. However, the following warnings must be observed.

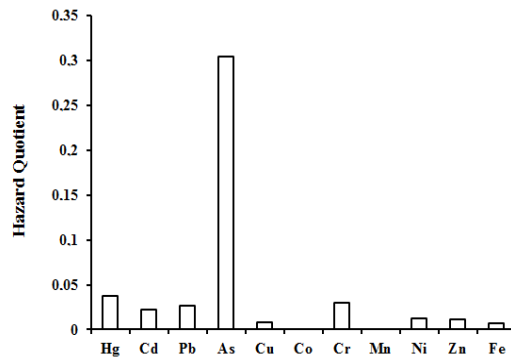
Despite these benefits, consuming fish from polluted areas is also risky in terms of health. In particular, the consumption of fish contaminated with non-essential toxic heavy metals is also harmful. Toxic metals such as Hg, As, Cd and Pb have no beneficial effect on human health and are harmful in every concentration. For example, if fish tissues have high in Hg amounts, which is associated to brain developmental problems. it should not be consumed. Thus, pregnant women should only eat low-Hg fish, such as salmon, sardines, anchovies and trout, and no more than one or maximum two servings. Although essential heavy metals such as Cu, Zn, Mn, Co and Fe are beneficial for human health, they can be harmful if their value in fish tissues exceeds a certain limit. Fish caught in areas contaminated with heavy metals may accumulate unwanted amounts in the edible tissues. In this case, there are some health problems in people who consume these fish. It may damage tissues and organs, especially as accumulation in the liver. It can cause cancer and even death.

Around twenty commercial fish species of in the Black Sea are exist, and the most heavily fished area of sea is found along the Turkish coasts. Thus, bioaccumulation and biomagnification are issues, with heavy metals of particular importance to Turkish exporters, who use scientific data to demonstrate the quality of the product.

The review articles show that heavy metals generally accumulate at high rates in the livers, internal organs, gills and skins. In this context, these organs or tissues of the fish should not be consumed. For this, these areas of the fish should be removed and thoroughly cleaned before cooking. If possible, the skin of the fish should also be removed. However, this is not possible in some fish such as whiting and small pelagic fish such as anchovies. Therefore, the fish should be cleaned and washed thoroughly before cooking. Let us know that the healthy consumption of the fish is in our hands. The cooking method is also very important. It should not be forgotten that baking in the oven is healthier than grilling on charcoal or frying in oil to avoid carcinogenic effects.

The edible tissue of the fish is the part where heavy metals accumulate the least. International and national guidelines such the European Union and the Turkish authorities give the permissible values of heavy metals in official regulations or in gazette. These values are regularly monitored and updated. Moreover, Food and Agriculture Organization (FAO) and World Health Organization (WHO) have set tolerable daily and weekly intakes of heavy metals for people. Target hazard quotient (THQ) are calculated from these values and the oral reference dose. Finally, total target hazard quotient shows us whether there is a risk to human health. Estimated hazard quotients of Hg, Cd, Pb, As, Cu, Co, Cr, Mn, Ni, Zn and Fe suggest that these contaminants in the edible tissues of all commercial fish species do not hazard any apparent threat to human, where the total THQ is approximately 0.46 of all the considered elements were below the value of 1 (Figure 1).

The consumption of the Black Sea fishes has become popular with the Turkish people, however, the intake of heavy metals, through fish consumption is of high issue for human health risk if exist. According to the existing literature, it is seen that the amounts of heavy metals accumulate in acceptable amounts and not to be harmful to the health of consumers.



**Fig.1: Hazard quotients of selected contaminants via consumption of edible tissues of commercial fish species from Turkish coastal waters of the Black Sea (Data from Bat, 2017)**

### Conclusion

Fish are often at the top of food chain in marine ecosystems and may concentrate large amounts of contaminants from the water, food and non-food particles. Based on the reviews done in commercial fish species in the Black Sea coast of Turkey was not any serious heavy metal pollution. An obvious view of heavy metal pollution in different regions of the Black Sea is hard to obtain due to a lack of comparable data from studies with similar methodologies. Bulgaria and Romania, which have the Black Sea coast, joined the European Union and Turkey, which has the candidate country, initiated several measures to be taken against pollution. The best example of this is the start of the treatment of wastes in the Danube River, which provides the largest contaminant input to the Black Sea. Nevertheless, many independent studies suggest that the actions of the heavy metal pollution monitoring studies are needed. Public and ecosystem health may be seriously affected, doing it obligation that each the Black Sea country adopt uniform rules and create a uniform and coordinated environmental policy (Murtaugh *et al.*, 2017).

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