A review on contamination of heavy metals, linear alkylbenzenes, polycyclic aromatic hydrocarbons, phenolic endocrine disrupting chemicals and organochlorine compounds in Perna viridis from the coastal waters of Malaysia: a compilation of 1998 data

Abstract

Since 1990s until today, the Asia-Pacific Mussel Watch approach has been widely used for biomonitoring purpose in Malaysia by using the green-lipped mussel Perna viridis in particular. This paper reviewed the concentrations of heavy metals (Cd, Cu, Pb and Zn), Linear Alkylbenzenes (LABs), Polycyclic Aromatic Hydrocarbons (PAHs), phenolic Endocrine Disrupting Chemicals (EDCs) [nonylphenol (NP), octylphenol (OP), and bisphenol A (BPA)] and organochlorine (OC) compounds (PCBs, DDTs, CHLs, HCHs and HCB) in nine mussel populations collected in 1998 from the coastal waters of Malaysia. In fact, all of these data were published separately in five different research journals in the literature. Since they discussed only based on the group of contaminants which they focused upon, this review paper aimed to see a holistic picture and understanding of the impacts of the different chemical contaminants in relation to the description of the sampling sites. Based on seven mussel populations with complete 11 chemicals (ranging from heavy metals, LABs, PAHs, phenolic EDCs and OCs), a dendrogram was established using single linkage cluster analysis. The clustering pattern showed two major subclusters. The first one comprising Tanjung Rhu, Trayong, Kuala Penyu and Pasir Panjang populations, indicating relatively uncontaminated conditions while the other subcluster consists of Penang, Kg. Pasir Puteh and Anjung Batu which indicated contaminated conditions as it is well supported by the elevated levels of some chemicals. The subcluster combining Penang and Kg. Pasir Puteh populations were mainly due to the elevated levels of LABs and PAHs in both sites while Kg. Pasir Puteh also had elevated levels of Cu, Pb, PCBs and CHLs. Anjung Batu, which is also clustering together with Penang and Kg. Pasir Puteh population can be explained by its elevated levels of three OC compounds namely DDTs, CHLs and HCHs. This comprehensive review is the first to report in the literature.

Keyword: Coastal water; Heavy metals; Malaysia; Mussel Watch programme; Perna viridis