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Relationship Between Tributyltin Contamination Level and Total Lipid Content in Body Tissues of Marine Invertebrates

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Abstract

Tributyltin (TBT) is a xenobiotic, and it has highly hydrophobic, lipophilic, and ionic characteristics resulting toxicity to living organisms. These chemicals easily cross cell membranes and accumulate in adipose tissue due to lipophilicity. TBT has a high affinity for biomagnification along food chains, in addition to bioaccumulation of these chemicals. This study aimed to find the relationship between the TBT contamination level and total lipid content in body tissues of collected molluscs samples (*Crassostrea madrasensis, Saccostrea cucullate, Perna viridis, P. perna, Thais clavigera*) to confirm their bioaccumulation potential. TBT levels in mollusc tissues were quantified using Gas Chromatography Mass Spectrometry method after Solid Phase Micro Extraction. Freeze-dried tissue samples of molluscs (n=10 from each species) were used for crude lipid extraction using a mixture of chloroform and methanol in gravimetric method. Different size classes of *P. viridis*; 0-15 g, 16-30 g, 31-45 g were used to study the relationship between TBT levels and different size classes. The results revealed that the highest concentration of TBT with the highest lipid content in body tissue of *P. viridis* (234±3 ng/kg and 5.84±1.4%) followed by *T. clavigera* (134±2.3 ng/kg and 2.01±0.6%). The average lipid content in gastropods was positively correlated ($P<0.005$) with the average TBT concentrations in all tested individuals. A positive correlation between TBT concentrations and total lipid content in body tissues of *C. madrasensis* ($P=0.004$), *S. cucullate* ($P=0.02$), *P. viridis* ($P=0.003$), *P. perna* ($P=0.001$) and *T. clavigera* ($P=0.001$) was found. Similarly, the highest concentration of TBT in the highest body weight of the mussels were observed. TBT contamination in different size classes of the *P. viridis* varied from 4±1.2 $ngkg^{-1}$ to 42±2.2 $ngkg^{-1}$ (wet weight). The highest level was recorded as 42±2.2 $ngkg^{-1}$ for 30-35 g size class in Dikkowita harbour, which is situated adjacent to the Colombo port. The TBT concentrations in *P. viridis* were recorded by ascending order of 12 $ngkg^{-1}$, 22 $ngkg^{-1}$ and 42 $ngkg^{-1}$ following the average body weight ranges of; 0-15 g<16-30 g<31-45 g, respectively. According to the results, there was a positive correlation of TBT with the body weight and fatty tissues accumulate a high level of TBT in molluscs.

***Keywords**:* Tributyltin, Bioaccumulation, Lipid tissues, Body size, Molluscs