

Occurrence of pesticides in surface water, pesticides removal efficiency in drinking water treatment plant and potential health risk to consumers in Tenggi River Basin, Malaysia

ABSTRACT

Agricultural activities have been arising along with the use of pesticides. The use of pesticides can impact not only on vector or other pest but also able to harm human health. Pesticide may leach from the irrigation of plant into the groundwater and in surface water. These waters could be sources of drinking water in a pesticides polluted area. This study aims to determine the occurrence pesticides in surface water and pesticides removal efficiency in a conventional drinking water treatment plant (DWTP) and the potential health risk to consumers. The study was conducted in Tanjung Karang, Selangor, Malaysia. Thirty river water samples and eighteen water samples from DWTP were collected. The water samples were extracted using solid phase extraction (SPE) before injected to the ultra-high performance liquid chromatography tandem mass spectrometry (UHPLC-MS/MS). Five hundreds and ten respondents were interviewed using questionnaires to obtain information for health risk assessments. The results showed that propiconazole had the highest mean concentration (4493.1 ng/L) while pymetrozine had the lowest mean concentration (1.3 ng/L) in river water samples. The pesticides removal efficiencies in the conventional DWTP were 77% (imidacloprid), 86% (propiconazole and buprofezin), 88% (tebuconazole) and 100% (pymetrozine, tricyclazole, chlorantraniliprole, azoxystrobin and trifloxystrobin), respectively. The hazard quotients (HQs) and hazard index (HI) for all target pesticides were <1, indicating there was no significant chronic non-carcinogenic health risk due to consumption of the drinking water. Conventional DWTP was not able to completely remove four pesticide; thus, advanced treatment systems need to be considered to safeguard the health of the community in future.

Keyword: UHPLC-MS/MS; Solid phase extraction; Hazard quotient; Tenggi River; Malaysia