Assessment of Phthalate Esters (PAEs) and Bisphenol A (BPA) in Treated Wastewater Samples Collected in Saudi Arabia and their Potential Health Risk

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Phthalates esters (PAEs) and bisphenol A (BPA) are harmful man-made chemicals that are used widely in plastic industry and can be found in many consumer products. Generally, research has linked them to serious health risks including cancer. The main concern arises from their potential endocrine disrupting effects that pose a negative impact on human health. Water is a scare resource in Saudi Arabia and therefore several wastewater treatment plants were installed to recycle water for irrigation and industrial applications. Several previous studies reported detectable levels of endocrine disrupting chemicals (EDCs) in treated wastewater and their adverse effects. This study is designed to assess the presence of six PAEs and BPA in secondary and tertiary treated wastewater samples and test their effects. Over 100 samples were collected in a period of five weeks from five major wastewater treatment plants (WTPs) located in three Saudi cities. Dimethyl phthalate (DMP), diethyl phthalate (DEP), di-n-butyl phthalate (DBP), benzyl butyl phthalate (BBP), diethyl hexyl phthalate (DEHP), di-n-octyl phthalate (DOP) and BPA were detected using headspace solid-phase micro-extraction (SPME) coupled to gas chromatography-mass spectrometer (GC-MS). Data analysis was managed using the one-way ANOVA statistical test. The results show that traces of PAEs and BPA are still found in treated wastewater used for irrigation even with extensive treatment processes. Though PAEs and BPA concentrations were relatively low, one should not rule-out their potential long-term accumulation in soil that poses a risk to the ecosystem and human health.

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