Abstract

There is a growing concern on heavy metals in consumer products due to their different potential human health risks and environmental effects. Present study was conducted to evaluate the concentrations of heavy metals (HMs) in various brands of sunblocks with emphasis on their health risk assessment (HRA). Questionnaire data were collected from the different universities of Lahore to determine the sunblocks using behavior and most commonly used sunblocks among the youth. Samples were collected from different pharmacies and shopping malls of Lahore, Pakistan based on pilot study data. Samples were prepared by using the wet acid digestion process and the different heavy metals were analyzed on flame atomic absorption spectrometer (iCE 3000 series). The toxic samples in which the heavy metals concentrations exceed from standards were further analyzed on induced couple plasma-optical emission spectrometry (ICP-OES). 5.755 ± 0.0901 mg/kg, 2.49 ± 0.0595 mg/kg, 5.3 ± 0.3744 mg/kg and 4 ± 0.3298 mg/kg were the highest detected value of lead (Pb), cadmium (Cd), nickel (Ni) and titanium (Ti) respectively. Concentrations of lead, cadmium, nickel and titanium exceed from the European Union (EU) standards. Concentration of the zinc (Zn) and aluminium (Al) were not exceeding from the United States Food and Drug Administration (USFDA) standards. Chromium (Cr) and arsenic (As) were not detected in any sample of sunblock. Heavy metals concentrations are used to determine the carcinogenic and non-carcinogen health risk assessment (HRA). Value of Margin of Safety (MoS) was greater than 100 (acceptable) for all heavy metals except Cd. Hazard Index (HI) was less than 1 and the value of the life time cancer risk (LCR) was in acceptable range (10^{-6} to 10^{-4}). In Pakistan, there are no standards present for the safety of the sunblocks. Hence, there is a need of national standards and policy guidelines for consumer products to create awareness and impose restrictions on the usage of toxic metals to safeguard public health and the environment.