Analysis of the Concentration of Heavy Metals in Khat Grown in Meru County and the Assessment of Their Associated Health Risks

Contamination of farm produce by toxic heavy metals has become a serious global health concern. These metals can bio-accumulate in plant tissues and are precursors for major public health problems such as cancer and neural impairment. Khat (Catha edulis) also referred to as miraa has the potential to sequester and accumulate both micronutrients and potentially toxic heavy metals in its consumable parts—tender leaves and soft barks of young shoots which are known to possess psychoactive properties when consumed. Therefore, the motivation behind this contribution is to determine the levels of six heavy metals, namely, cadmium (Cd), copper (Cu), chromium (Cr), lead (Pb), iron (Fe), and nickel (Ni) in consumable Meru Khat samples, compare these levels with the permissible limits of World Health Organization (WHO) in order to predict associated health risks, and to estimate the noncarcinogenic risks of these metals by total health quotient (THQ) and health index (HI) on Khat consumers. 1.0 g of dry ground Khat samples was digested in 0.05 M HCl and allowed to stand for 5 hours before being analyzed for heavy metals using inductively coupled plasma atomic emission spectroscopy (ICP-AES). The mean heavy metal concentrations (mg/kg) in dry Khat samples of six toxic heavy metals were Cd (7.81 ± 1.56), Cr (15.98 ± 2.22), Cu (15.81 ± 2.84), Fe (97.35 ± 32.67), Ni (0.37 ± 0.02), and Pb (32.36 ± 9.95). Based on the results, the mean levels of Pb, Cd, and Cr exceeded WHO permissible limits. In addition, the Pb and Cd THQ values and the HI of the six heavy metals investigated in the Khat samples exceeded the threshold value of 1.0. Furthermore, the THQ and HI values showed that Pb and Cd were potentially the major contributors to non-carcinogenic risks on regular Khat consumers. This is a matter of concern on the excessive consumption of Meru Khat-based products, which over time may cause a toxicological response. Based on the fndings of this study, the use of agrochemicals should signifcantly be minimized in Khat farming. Accordingly, the Meru Khat farmers should be sensitized on alternative farming practices that do not potentially cause heavy metal contamination in Khat.