Abstract

Polymer (polystyrene) packaging material used for food transportation has direct impact on food quality. I aimed this research to screen the pollution load of heavy metals in food material, polystyrene containers along with the transfer from polystyrene packing to food material. This research was also aimed to investigate potential human health risk hazards associated with consumption of such food materials. Study area was divided into eight stations to collect (n=120) samples comprising the eight districts from Punjab, Sindh and Baluchistan Provinces along with Mirpur Azad Jammu and Kashmir and Islamabad capital territory. Extracted concentrations of heavy metals including lead (Pb), chromium (Cr), nickel (Ni), copper (Cu), zinc (Zn), Manganese (Mn) and cadmium (Cd) were determined using atomic absorption spectrophotometer. Significant concentration of heavy metals were detected. The mean value (mg/kg) of Pb reported in PS before food serving was (1.05±0.49) with concentration ranged from 0.12 to 1.86, food samples served in polystyrene range from 0.04 to 2.11 with mean value of 1.28±0.51 and PS after food serving with a range of 0.06-1.98 and mean value 1.26±0.43. The mean value (mg/kg) of Cr reported in PS before food serving was (0.30±0.73) with concentration ranged 0.00-3.01, food samples served in polystyrene range 0.00-4.32 with mean value of 0.36±1.06 and PS after food serving with a range of 0.10-4.03 and mean value 0.47±0.96. Level (mg/kg) of Cd reported in PS before food serving was (0.31±0.06) with concentration ranged 0.21-0.44, food samples served in polystyrene range 0.24-0.45 with mean value of 0.32±0.06 and PS after food serving with a range of 0.25-0.34 and mean value 0.30±0.03. Transfer factor (TF) was calculated to determine the transfer of metals from polystyrene packing material to the food material that revealed TF was highest 1.38 for Mn and lowest 0.91 for Zn. It reflected that Mn was most translocated from packing material to food material. The data revealed that the values of daily intake of metals (DIM) were higher for Mn^{2+}. Food served in polystyrene packaging. HRI was found higher for pb^{2+} and its rank appeared as $Pb^{2+} > Cd^{2+} > Mn^{2+} > Ni^{2+} > Cr^{2+} \geq Cu^{2+} \geq Zn^{2+}$ in case of food material served in polystyrene containers. Results of DIM and HRI revealed a marginal risk to human health through consumption of food being served in polystyrene containers. Carcinogenic and non-carcinogenic risks need to be identified separately and results should be disseminated to the food authorities of the country to make some policies to stop such poor practices, which directly deteriorate the human health.