**A Study on the Elemental Composition, Nutritional Values, and Health Risks of Some Chocolate Brands Available in Turkish Markets**

**Authors**: Ayşegül Erdoğan[1], Mehmet Emin Şeker[2], Bayram Yüksel[3], Fikret Ustaoğlu[4] and Mehmet Metin Yazman[5]
**Affiliation**: *[1]Ege University Application and Research Center for Testing and Analysis (EGE MATAL), Bornova, 35100 Izmir, Türkiye, [2]Giresun University, Program of Medicinal and Aromatic Plants, Espiye, 28600 Giresun, Türkiye, [3]Giresun University, Department of Property Protection and Security, Espiye, 28600 Giresun, Türkiye, [4]Giresun University, Department of Biology, Gure Campus, 28200, Giresun, Türkiye, [5]Giresun University, Department of Food Processing, Espiye, 28600 Giresun, Türkiye*
mehmetemin_seker@hotmail.com

Chocolate, a widely consumed product across diverse age groups, underwent elemental analysis using inductively coupled plasma mass spectrometry (ICP-MS) following microwave-assisted acid digestion. The study focused on white, milky, and dark samples from the top 6 best-selling chocolate brands in Turkish markets. Although numerous studies in the literature have explored the benefits of chocolate, there is a scarcity of research on its potential health hazards. Results were employed to ascertain recommended daily allowances (RDA) and assess health risk levels. According to the results obtained from white, milky and dark chocolates, the mean values of the elements are as follows, respectively: Na: 1848-1564-273; Mg: 350-829-2344; P: 3471-3998-4562; K: 5728-8095-17138; Ca: 4334-3752-1438; Mn:0.48-5.99-25.95; Fe: 8.24-71.95-345.34; Cu: 0.50-5.21-19.71; Zn: 14.27-16.86-34.32 µg g$^{-1}$. The mean elemental levels in white, milky and dark chocolates demonstrated a cocoa-content-dependent increase particularly for Mg, P, K, Mn, Fe, Cu, and Zn and dark chocolate was found to be rich in these elements. However, an escalation in cocoa content corresponded to heightened health risks, with mean values for potentially toxic elements increasing in the same order as follows: Cr: 0.06-0.69-3.10; Ni:0.21-1.34-4.96; Cd: 0.16-0.14-0.21; and Pb: 0.079-0.096-0.141 µg g$^{-1}$. Arsenic was not detected in any samples. Although the target hazard quotient (THQ) and hazard index (HI) remained below 1 for all samples (based on a 5-gram daily consumption), the carcinogenic risk (CR) for Ni, and Cr raised concerns. The carcinogenic risk values for Pb are $1.72 \times 10^{-8}$-$3.06 \times 10^{-8}$; $1.36 \times 10^{-6}$-$2.02 \times 10^{-6}$ for Cd; $9.03 \times 10^{-6}$-$2.15 \times 10^{-4}$ for Ni; and for Cr it is in the range of $7.55 \times 10^{-7}$-$3.93 \times 10^{-5}$. Notably, Ni and Cr presented moderate risks, escalating linearly from white to dark chocolate. Thus, it becomes crucial for consumers to balance the nutritional benefits with the potential health risks when consuming different varieties of chocolate. [1–4].

**Keywords:** Chocolate; elemental analysis; ICP-MS; health risk assessment; carcinogenic risk.

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