SUPPLEMENTARY MATERIAL

Domagalska J, Zadęcka M, Rusin M, Górski M, Buczkowska M. A quantitative assessment of heavy metal contamination in instant coffee beverages: A comparative analysis of toxic element content and public health risk implications. *Pol Ann Med*. https://doi.org/10.29089/paom/195838.

Table 1a. Concentration of selected heavy metals in coffee beverage samples.

No.	Sample Code	Cd [mg/kg] LOQ- 0.01	Pb [mg/kg] LOQ – 0.10	As [mg/kg] LOQ-0.48	Zn [mg/kg] LOQ-0.69	Ni [mg/kg] LOQ-0.42	Cr [mg/kg] LOQ -0.21
1	M1/II/23/24	<0.01	<0.10	<0.48	1.72	< 0.42	0.30
2	M2/II/23/24	<0.01	<0.10	<0.48	0.70	< 0.42	0.26
3	M3/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.26
4	M4/II/23/24	<0.01	<0.10	<0.48	0.97	0.72	0.27
5	M5/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.26
6	M6/II/23/24	<0.01	<0.10	<0.48	2.21	< 0.42	0.25
7	M7/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.27
8	M8/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.25
9	M9/II/23/24	<0.01	<0.10	<0.48	1.62	0.67	0.31
10	M10/II/23/24	<0.01	<0.10	<0.48	8.71	< 0.42	0.28
11	M11/II/23/24	<0.01	<0.10	<0.48	3.35	< 0.42	0.27
12	M12/II/23/24	<0.01	<0.10	<0.48	4.89	< 0.42	0.29
13	M13/II/23/24	<0.01	<0.10	<0.48	2.40	< 0.42	0.28
14	M14/II/23/24	<0.01	<0.10	<0.48	0.80	< 0.42	0.27
15	M15/II/23/24	0.02	<0.10	<0.48	9.81	0.89	0.52
16	M16/II/23/24	<0.01	<0.10	<0.48	0.92	< 0.42	0.30
17	M17/II/23/24	<0.01	<0.10	<0.48	10.86	< 0.42	0.27
18	M18/II/23/24	<0.01	<0.10	0.58	1.76	< 0.42	0.32
19	M19/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.29
20	M20/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.29
21	M21/II/23/24	<0.01	<0.10	<0.48	2.29	< 0.42	0.27
22	M22/II/23/24	<0.01	<0.10	<0.48	4.05	< 0.42	0.29
23	M23/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.29
24	M24/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.27
25	M25/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.29
26	M26/II/23/24	<0.01	<0.10	<0.48	0.78	< 0.42	0.30
27	M27/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.25
28	M28/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.24
29	M29/II/23/24	<0.01	<0.10	<0.48	10.07	< 0.42	0.28
30	M30/II/23/24	<0.01	<0.10	<0.48	8.55	0.84	0.45
31	M31/II/23/24	<0.01	<0.10	<0.48	8.34	0.88	0.52
32	M32/II/23/24	<0.01	<0.10	<0.48	5.21	< 0.42	0.23
33	M33/II/23/24	<0.01	<0.10	<0.48	3.23	< 0.42	0.24
34	M34/II/23/24	<0.01	<0.10	<0.48	3.99	< 0.42	0.24
35	M35/II/23/24	<0.01	<0.10	<0.48	3.64	< 0.42	0.25
36	M36/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.22
37	M37/II/23/24	<0.01	<0.10	<0.48	10.69	< 0.42	0.29
38	M38/II/23/24	<0.01	<0.10	<0.48	9.24	< 0.42	0.28
39	M39/II/23/24	<0.01	<0.10	<0.48	1.80	2.85	0.26

No.	Sample Code	Cd [mg/kg] LOQ- 0.01	Pb [mg/kg] LOQ – 0.10	As [mg/kg] LOQ-0.48	Zn [mg/kg] LOQ-0.69	Ni [mg/kg] LOQ-0.42	Cr [mg/kg] LOQ -0.21
40	M40/II/23/24	<0.01	<0.10	<0.48	1.35	1.86	0.26
41	M41/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.26
42	M42/II23/24	<0.01	<0.10	<0.48	0.95	0.50	0.25
43	M43/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.24
44	M44/II/23/24	<0.01	<0.10	<0.48	8.62	0.60	0.49
45	M45/II/23/24	<0.01	<0.10	<0.48	4.60	< 0.42	0.27
46	M46/II/23/24	<0.01	<0.10	<0.48	4.18	< 0.42	0.26
47	M47/II/23/24	<0.01	<0.10	<0.48	10.49	< 0.42	0.25
48	M48/II/23/24	<0.01	<0.10	<0.48	< 0.69	< 0.42	0.24
49	M49/II/23/24	<0.01	<0.10	<0.48	0.70	< 0.42	0.22
50	M50/II/23/24	<0.01	<0.10	<0.48	3.57	< 0.42	0.29

Comments: LOQ – limit of quantification

Maximum Levels of Heavy Metals in Coffee Samples

Maximum Levels of Heavy Metals in Coffee Samples (Including Values Above LOQ)

Table 1b. Average daily dose and hazard quotient for oral exposure based on instant coffee content in selected coffee beverages

Trace element	Concentration [mg/kg]	RfD [mg/kg/day]	ADD[mg/kg/day]	HQ	HI
Group 1					
Zn	1.99	0.3	0.00043	0.0014	
Ni	0.21	0.02	0.00005	0.0023	0.0656
Cr	0.26	**0.0009**	0.00006	0.0619	
Group 2					
Zn	2.05	0.3	0.00044	0.0015	
Ni	0.21	0.02	0.00005	0.0023	0.0680
Cr	0.27	0.0009	0.00006	0.0643	
Group 3					
Zn	3.36	0.3	0.00072	0.0024	
Ni	0.77	0.02	0.00017	0.0083	0.0868
Cr	0.32	0.0009	0.00007	0.0762	

Comments: RfD - reference dose, ADD - average daily dose of the element ingested, HQ - hazard quotient, HI - cumulative hazard index, Group 1 - coffee content <8%, Group 2 - coffee content 8-10%, Group 3 - coffee content >10%

Table 1c. Average daily dose and hazard quotient for oral exposure based on beverage production location

Trace element	Concentration [mg/kg]	RfD [mg/kg/day]	ADD[mg/kg/day]	HQ	HI
Poland					
Zn	0.28	0.3	0.00006	0.0002	
Ni	2.61	0.02	0.00056	0.0280	0.1639
Cr	0.57	**0.0009**	0.00012	0.1357	
Netherlands					
Zn	0.29	0.3	0.00006	0.0002	
Ni	5.70	0.02	0.00122	0.0611	0.1708
Cr	0.46	0.0009	0.00010	0.1095	

Comments: RfD - reference dose, ADD - average daily dose of the element ingested, HQ - hazard quotient, HI - cumulative hazard index

Table 1d. Average daily dose and hazard quotient for oral exposure based on the manufacturer of the analyzed products

Trace element	Concentration [mg/kg]	RfD [mg/kg/day]	ADD[mg/kg/day]	HQ	HI
Producer 1					
Zn	0.29	0.3	0.00006	0.0002	
Ni	5.7	0.02	0.00122	0.0611	0.1708
Cr	0.46	**0.0009**	0.00010	0.1095	
Producer 2					
Zn	0.28	0.3	0.00006	0.0002	
Ni	1.71	0.02	0.00037	0.0183	0.1780
Cr	0.67	0.0009	0.00014	0.1595	
Producer 3					
Zn	0.29	0.3	0.00006	0.0002	
Ni	3.41	0.02	0.00073	0.0365	0.1510
Cr	0.48	0.0009	0.00010	0.1143	

Comments: RfD - reference dose, ADD - average daily dose of the element ingested, HQ - hazard quotient, HI - cumulative hazard index