Sesame seeds

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Abstract

Sesame seeds in the HMI library has 156 reported results for lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, Co, Cu, Fe, Mn, Zn, V, Se, Ba, Be, Sr and Tl from 14 sources. WHO GEMS/Food submissions reported lead in sesame seeds as sold from 467 results in 5 reporting regions, with subgroup medians from 10 to 23 µg/kg. For cadmium, GEMS/Food gave subgroup medians from 8 to 56 µg/kg from 781 results.

1 | Sesame seeds overview

Across 2 other studies of ordinary farms and markets, reported lead means and medians on a dry-weight basis ranged from 15 µg/kg (Cicero et al. 2022) to 347 µg/kg (Matloob 2016).[3,4] For cadmium, 2 studies on an as-sold or fresh-weight basis reported means and medians from 25 µg/kg (Tinggi et al. 2025) to 37.5 µg/kg (EMRKB et al. 2019).[7,8]

For a buyer the practical points are the form bought, the basis a result is reported on, where the sesame seeds came from and the laboratory's reporting limit. Testing finds contamination but does not remove it.

2 | What counts as sesame seeds

This page covers sesame seeds in 4 forms kept separate in every comparison: sesame seeds as sold (130 results), sesame seeds oil (17 results), dried sesame seeds (7 results) cooked and sesame seeds (2 results).[1,2,3,4,5,6] Foods made from sesame seeds that have their own pages, such as sesame oil, are covered there.

Results stay on the basis each source reports: as sold or fresh weight, dry weight, or unstated. Dry-weight, as-sold and unstated results are never pooled, and no moisture conversion is applied.

3 | How metals reach sesame seeds

No study in the library compared sesame seeds from contaminated and ordinary settings, so the routes by which metals reach it are not measured here.

4 | Which forms and regions measured lower

The HMI reference for lead in sesame seeds as sold pools 42 subgroup units from 1 sampling family, with a median of between 3.5 and 20 µg/kg and a middle half spanning below 10 (lower quartile) and between 15 and 40 µg/kg (upper quartile).[1] for lead in sesame seeds oil, the reference median was below 90 µg/kg, with a middle half from below 90 to below 90 µg/kg across 5 units.[1] for cadmium in sesame seeds as sold, the reference median was 27.7 µg/kg, with a middle half from between 18.1 and 20.8 to 27.7 µg/kg across 33 units.[1,8]

Among GEMS/Food reporting regions, sesame seeds as sold had the lowest lead subgroup median in PAHO (10 µg/kg) and the highest in AFRO (23 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in AFRO (8 µg/kg) and the highest in EURO (56 µg/kg).[1]

In one study, lead across 5 groups of sesame seeds ranged from 0.07 µg/kg (flavored tahini product 35 (Tehran market)) to 0.3 µg/kg (flavored tahini product 33 (Tehran market)); the lowest is the lowest observed in that study, not an established sourcing preference.[6]

5 | Processing, cooking and preparation

Processed or prepared forms were compared only with unprocessed sesame seeds in the same study and group. Sesame seeds oil (GEMS/Food contaminants database) had cadmium lower at 4.7 µg/kg, against 23.9 µg/kg for the unprocessed form in the same group (sesame seeds as sold).[9]

Forms differ in water content, so a per-kilogram difference is not by itself a measured removal or gain of metal.

6 | Mitigation for sesame seeds

Lot testing against the applicable limit is the check that can be verified.

7 | Trade-offs and limits of controls

Metals do not move together, so a lot that passes a lead limit says little about cadmium, arsenic or nickel unless those are tested as well.

8 | Testing sesame seeds for metals

Results depend on the method and its reporting limit. Reporting limits for lead ranged from 1 µg/kg (WHO GEMS/Food) to 200 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for cadmium ranged from 0.5 µg/kg (WHO GEMS/Food) to 63.2 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1] Reporting limits for total arsenic ranged from 2 µg/kg (WHO GEMS/Food) to 350 µg/kg (WHO GEMS/Food), so a non-detect from a less sensitive method says much less.[1]

A useful lot result names the form, the basis and a quantification limit well below the limit that applies.

9 | Buying and verifying sesame seeds

No maximum level for metals in sesame seeds was verified from primary text for this page; buyers should confirm the limit that applies in the destination market.

10 | Exposure from sesame seeds

No source in the library converted sesame seeds concentrations into a verified estimate of intake for a defined population. Concentrations describe the food, not individual risk.

11 | Evidence review and remaining gaps

Every source record that names sesame seeds was decided on its content: 14 occurrence extracted, 14 records in all. The occurrence table renders every extracted result; held values remain visible with their reason.

References identify the sources used in these answers. The Sources index preserves additional discovery links; inclusion there does not mean a source has been reviewed for this assessment. Corrections, completed searches, new direct evidence and changes in requirements should reopen the relevant answer.

12 | Sesame seeds FAQs

The library reports lead, cadmium, total arsenic, inorganic arsenic, total mercury, nickel, chromium, aluminum, tin, antimony, Co, Cu, Fe, Mn, Zn, V, Se, Ba, Be, Sr and Tl in sesame seeds, most often lead, cadmium and total arsenic.[1,2,3,4] WHO GEMS/Food submissions reported lead in sesame seeds as sold from 467 results in 5 reporting regions, with subgroup medians from 10 to 23 µg/kg.[1]

Among GEMS/Food reporting regions, sesame seeds as sold had the lowest lead subgroup median in PAHO (10 µg/kg) and the highest in AFRO (23 µg/kg); reporting regions are markets, not growing areas.[1] For cadmium, the lowest regional median was in AFRO (8 µg/kg) and the highest in EURO (56 µg/kg).[1]

Only comparisons between forms in the same study are available, not before-and-after measurements of the same sesame seeds.[9] sesame seeds oil (GEMS/Food contaminants database) had cadmium lower at 4.7 µg/kg, against 23.9 µg/kg for the unprocessed form in the same group (sesame seeds as sold).[9]

Inorganic arsenic, the more toxic form, was measured in 4 results from 2 sources, far fewer than total arsenic.[1,10] European Food Safety Authority (EFSA) 2014 reported inorganic arsenic at 20.1 µg/kg (mean) in sesame seeds as sold from European dietary-survey occurrence data.[10]

References

[1] GEMS/Food Contaminants database heavy-metal exports
World Health Organization · GEMS/Food Contamination Monitoring and Assessment Programme · 2026 · extranet.who.int
DATASET

[2] Essential and toxic elements in plant-based dairy alternatives: implications for vegan diets
Ondřej Zvěřina, Pavlína Kosečková, Pavel Coufalík, Dominika Michaličková, and Eva Duborská · European Food Research and Technology · 2025 · doi.org/10.1007/s00217-025-04775-1
PEER-REVIEWED

[3] Mineral and Microbiological Analysis of Spices and Aromatic Herbs
Cicero N, Gervasi T, Durazzo A, Lucarini M, Macrì A, Nava V, et al. · Foods · 2022 · doi.org/10.3390/foods11040548
PEER-REVIEWED

[4] Using Stripping Voltammetry to Determine Heavy Metals in Cooking Spices Used in Iraq
Matloob MH · Polish Journal of Environmental Studies · 2016 · doi.org/10.15244/pjoes/62401
PEER-REVIEWED

[5] Effects of food processing methods on migration of heavy metals to food
Lee JG, Hwang JY, Lee HE, Kim TH, Choi JD, and Gang GJ · Applied Biological Chemistry · 2019 · doi.org/10.1186/s13765-019-0470-0
PEER-REVIEWED

[6] Simultaneous determination of heavy metals in Tahini by anodic stripping voltammetry
Sadeghi, Naficeh, Behzadi, Hassan Rezaei, Behzad, Masoomeh, Jannat, Behrooz, and Hajimahmoodi, Mannan · Journal of Human, Health and Halal Metrics · 2021 · doi.org/10.30502/jhhhm.2021.288521.1034
PEER-REVIEWED

[7] Heavy metal analysis in commercial spices and herbs by inductively coupled plasma mass spectrometry (ICP-MS) and estimated dietary exposure
Tinggi U, Farrell M, Porter J, Mitchell S, and Jurd S · Journal of Environmental Exposure Assessment · 2025 · doi.org/10.20517/jeea.2025.10
PEER-REVIEWED

[8] Arsenic and cadmium concentrations in legumes and cereals grown in the North Central Province, Sri Lanka and assessment of their health risk
Edirisinghe EMRKB and Jinadasa BKKK · International Journal of Food Contamination 6:3 · 2019 · doi.org/10.1186/s40550-019-0073-x
PEER-REVIEWED

[9] Cadmium: dietary exposure assessment
Joint FAO/WHO Expert Committee on Food Additives · WHO Food Additives Series, No. 82 (Safety evaluation of certain contaminants in food, prepared by the 91st meeting of JECFA) · 2022 · www.who.int
GOVERNMENT

[10] Dietary exposure to inorganic arsenic in the European population
European Food Safety Authority (EFSA) · EFSA Journal 2014;12(3):3597 · 2014 · doi.org/10.2903/j.efsa.2014.3597
GOVERNMENT

STATUS AND LICENCE

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COMPETING INTERESTS

The Heavy Metal Index reports what the peer-reviewed and regulatory literature supports. It is operated separately from any certification program, does not evaluate or endorse brands, and does not use certification thresholds as evidence for the statements made here.

DATA AVAILABILITY

Every source behind this ingredient profile is listed with its own source record at https://heavymetalindex.com/ingredients/sesame#sources.

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