



OPEN ACCESS

EDITED BY
Michael Erich Netzel,
The University of Queensland, Australia

REVIEWED BY
Elisa Julianti,
University of North Sumatra, Indonesia
Tommaso Filippini,
University of Modena and Reggio Emilia, Italy

*CORRESPONDENCE
Ceyhan Ceran Serdar
✉ ceyhan.ceran@ankaramedipol.edu.tr

RECEIVED 08 March 2024
ACCEPTED 22 May 2024
PUBLISHED 12 June 2024

CITATION
Ceran Serdar C (2024) Commentary:
Acrylamide formation in air-fried versus deep
and oven-fried potatoes.
Front. Nutr. 11:1397302.
doi: 10.3389/fnut.2024.1397302

COPYRIGHT
© 2024 Ceran Serdar. This is an open-access
article distributed under the terms of the
[Creative Commons Attribution License \(CC
BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in
other forums is permitted, provided the
original author(s) and the copyright owner(s)
are credited and that the original publication
in this journal is cited, in accordance with
accepted academic practice. No use,
distribution or reproduction is permitted
which does not comply with these terms.

Commentary: Acrylamide formation in air-fried versus deep and oven-fried potatoes

Ceyhan Ceran Serdar *

Department of Medical Biology and Genetics, School of Medicine, Ankara Medipol University, Ankara, Türkiye

KEYWORDS

acrylamide, LoD, LoQ, potato chip, air frying, oven frying, deep frying of potatoes

A Commentary on Acrylamide formation in air-fried versus deep and oven-fried potatoes

by Navruz-Varlı, S., and Mortaş, H. (2024). *Front. Nutr.* 10:1297069.
doi: 10.3389/fnut.2023.1297069

The recent surge in popularity of air fryers, attributed to their ease of use and the widespread belief in their health benefits, has led to increased interest in the health implications of air-fried foods. A recent study by Navruz-Varlı and Mortaş (1) titled “Acrylamide formation in air-fried versus deep and oven-fried potatoes”, which investigated the health aspects of air-fried products, was particularly engaging for scientists aiming to understand the potential benefits and risks associated with this cooking method.

I would like to thank the authors for their contributions to your journal. It caught my attention that this article is being referenced by dietitians on social media. Recognizing the public's heightened interest in research with practical applications and aiming to ensure the responsible translation of the study's conclusions into both personal practice and potential dissemination to the broader community, avoiding any unintended implications, I critically evaluated the study from the perspective of a diagnostic kit developer. As a result, I would like to raise some points for your consideration as well as your readers' consideration.

1. In the article, the limit of detection (LoD) and limit of quantification (LoQ) values for acrylamide measurement were provided as 4.84 ng/g ($\mu\text{g}/\text{kg}$) and 18.20 ng/g ($\mu\text{g}/\text{kg}$), respectively (1). All the mean acrylamide levels presented in both the tables and the graphs are significantly lower than the stated LoQ values of 18.20 ng/g ($\mu\text{g}/\text{kg}$) (1). By definition, “limit of quantitation” refers to the lowest limit of an analyte that can be precisely quantified by the method of interest. Analyte levels falling between the LoD and LoQ can only be claimed to be present in the sample, yet it is not valid to state a precise quantity for them. This is because their levels are too low to be precisely determined by the method of interest. To illustrate, a sample measured slightly above the LoD in the first measurement might fall below the LoQ when reanalyzed. Consequently, acrylamide levels between 4.84 ng/g ($\mu\text{g}/\text{kg}$) and 18.20 ng/g ($\mu\text{g}/\text{kg}$) cannot be distinguished using the analytical method employed in this study. Despite this limitation, all mean acrylamide values provided for the differently treated potato samples fall below the LoQ limit of 18.20 ng/g ($\mu\text{g}/\text{kg}$), indicating that they cannot be differentiated from each other. Notably, the article emphasizes that the acrylamide level in the samples subjected to soaking in the “Deep frying” group is statistically significantly lower than the samples subjected to washing. However, the acrylamide level of the former ($1.18 \pm 0.18 \mu\text{g}/\text{kg}$) falls even below the LoD, signifying non-detectable concentrations.

2. The authors refer to a previous study by Rufián-Henares and Morales for the determination of LoQ and LoD. In this study, spiked potato homogenates, referred to as “reference material,” were used with increasing concentrations of acrylamide to determine the analytical performance values (LoD and LoQ) of the acrylamide-measurement assays (2). It is noteworthy that the starting potato chip sample, referred to as “reference material” in the referenced study, was not a true “blank” sample with “0 µg/kg acrylamide”; in fact, it already contained 575 ± 37 µg/kg acrylamide to start with, as determined by an alternative method (2). As LoD and LoQ cannot technically be determined in the absence of a true blank sample, it is crucial that the exact methodology for the determination of LoD and LoQ in the current study be elaborately explained.
3. The acrylamide levels reported in the study seem excessively low and inconsistent with the previous literature. They are approximately 10 times lower than those reported by Giovanelli et al. (3) and Sansano et al. (4). Acrylamide levels in sunflower oil were previously reported to be between 890 and 1,200 µg/kg (5). This suggests that even slight cross-contamination from the sunflower oil used to cook the potatoes could easily be the sole reason for the acrylamide levels measured between 1.18 µg/kg and 16.69 µg/kg in the current study. On the other hand, the FDA report (6) states that chips/French fries are not devoid of acrylamide; in fact, acrylamide levels in chips/French fries were reported to be considerably high, ranging from 59 to 5200 µg/kg (6). The original literature that the authors of the current article refer to for LoD and LoQ determination also mentions that the acrylamide level in the reference potato chips sample was 575 ± 37 µg/kg, significantly higher than the acrylamide levels reported in the current article for potato samples (2). This significant discrepancy between the previous literature and the results published in the current study suggests that the acrylamide levels reported in the current study are either improperly measured or inaccurate, potentially leading to misleading conclusions.
4. In the limitations section, the authors state that “each processing procedure was applied in four different groups, totally 24 samples”. However, the acrylamide results corresponding to the six groups (three different frying conditions, each having two different pre-processing options) were presented throughout the manuscript. Considering a total of 24 samples, the sample size of each tested condition will vary depending on the total number of groups (the sample size per group would be six for a study involving four different

groups, while the sample size per group would be four for a study involving six different groups). It would be helpful to clarify the sample size per group, as there seems to be a slight discrepancy between the stated total number of samples (24) and the number of groups presented with acrylamide results (6). This clarification would ensure that readers have all the necessary information to fully interpret the results.

This study delves into a topic that has garnered significant public interest, making it a potential reference for diverse audiences with varying levels of scientific expertise. Recognizing its potential reach beyond the academic community, it is crucial to address the previously discussed inconsistencies to ensure clarity and prevent misinterpretations. By meticulously addressing these discrepancies, this publication can achieve its intended impact and facilitate accurate understanding among a broad readership. This rigorous approach safeguards the integrity of the research and its dissemination throughout society.

Author contributions

CCS: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

1. Navruz-Varlı S, Mortaş H. Acrylamide formation in air-fried versus deep and oven-fried potatoes. *Front Nutr.* (2024) 10:1297069. doi: 10.3389/fnut.2023.1297069
2. Rufián-Henares JA, Morales FJ. Determination of acrylamide in potato chips by a reversed-phase LC–MS method based on a stable isotope dilution assay. *Food Chem.* (2006) 97:555–62. doi: 10.1016/j.foodchem.2005.06.007
3. Giovanelli G, Torri L, Sinelli N, Buratti S. Comparative study of physico-chemical and sensory characteristics of French fries prepared from frozen potatoes using different cooking systems. *Eur Food Res Technol.* (2017) 243:1619–31. doi: 10.1007/s00217-017-2870-x
4. Sansano M, Juan-Borrás M, Escriche I, Andrés A, Heredia A. Effect of pre-treatments and air-frying, a novel technology, and acrylamide generation in fried potatoes. *J Food Sci.* (2015) 80:1120–8. doi: 10.1111/1750-3841.12843
5. Başaran B, Turk H. The influence of consecutive use of different oil types and frying oil in French fries on the acrylamide level. *J Food Compos Anal.* (2021) 104:104177. doi: 10.1016/j.jfca.2021.104177
6. Food and Agriculture Organization/World Health Organization. *Code of Practice for the Reduction of Acrylamide in Foods*. Rome: Food and Agriculture Organization/World Health Organization (2009).