

# Be aware of the public health risks associated with phosphorus!



Kemberly Nertulus<sup>1</sup>, Natalia Mildred<sup>2</sup>

<sup>1</sup> Washington University in St. Louis, Department of Anthropology  
<sup>2</sup> University of Florida, College of Agriculture and Life Science

## Introduction

Phosphorus (P) is essential for the bodily functions and growth of animals, plants, and humans. However, excessive use can be harmful to the environment and human health. While the recommended phosphorus intake for adults is 700 mg/day, the average daily intake is approximately 1400 mg/day. Overconsumption can be caused by inorganic phosphorus found in additives used to enhance the appearance and affordability of food products, leading to an imbalance between phosphorus and calcium and resulting in various health issues. Overconsumption of inorganic phosphorus can lead to serious conditions such as hyperphosphatemia, resulting in bone weakness, cardiovascular diseases, chronic kidney disease, lower cognitive function, and other chronic conditions.

## Objective

- Perform an in-depth literature review on current prevention methods to minimize the health effects of phosphorus.
- Increase public awareness regarding excessive phosphorus consumption.

## Methods

- Reviewed 12 scholarly articles from 2011 to 2023 concerning the influence of phosphorus on public health.
- Articles were discovered on the following databases: ScienceDirect, National Library of Medicine, JSTOR, and Google Scholar.
- Developed a presentation summarizing the findings from these articles to present to a particular demographic that would benefit from this information.
- Presented the findings to stakeholders and community members, specifically retired elderly educators residing in a retirement community who might be at risk of health problems due to excessive phosphorus intake.
- Organized community dialogues with stakeholders.

## Results/Discussion

- After conducting a comprehensive review, it was determined that excessive phosphorus intake is frequently associated with food additives, particularly in meats, takeout, and processed foods. Most of the reviewed literature emphasized the responsibility of food manufacturers and suppliers for not labeling food products with precise phosphorus concentrations. Furthermore, certain products are not required to indicate phosphorus as an ingredient if the concentration falls below a certain threshold. This issue presents considerable challenges, including socioeconomic constraints that limit access to healthier, additive-free foods
- A significant imbalance exists between phosphorus (P) and calcium (C) absorption within the body. Phosphate ions are absorbed at twice the rate of calcium ions, and inorganic phosphate is absorbed even faster than organic phosphate obtained from naturally grown foods. This imbalance can disrupt homeostasis and hormonal equilibrium; consequently, it contributes to conditions such as chronic kidney disease and hypertension over an extended period
- Following a short survey and discussion, residents of Clemson Downs expressed limited awareness of phosphorus and its effects, showing no previous concern about their phosphorus intake. However, after the presentation, they actively engaged by asking questions on how to reduce phosphorus consumption and the various forms it can take. They also joined in discussions on how to implement this newfound knowledge into their daily lives.



Figure 1: Presentation slides for Clemson Downs created by Kemberly Nertulus



Figure 2: Conversation with the residents at Clemson Downs



Figure 3: Presenting to the residents at Clemson Downs

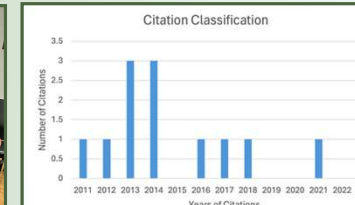


Figure 4: Graph created citations years of articles involved

## Conclusion

It is important to understand the appropriate levels of phosphorus exposure to the public and to conduct more assessments on the health impacts of calcium and phosphorus imbalance. Phosphorus plays multi-functional roles in various physiological and pathological processes, highlighting the necessity for further research and public health interventions to limit excessive phosphate intake.

## Acknowledgments

This work is funded by the National Science Foundation (NSF) through the STEPS organization. I would like to thank the Clemson Downs for allowing me to present to their residents. I would also like to thank other contributors to this project: Clemson University and NC State advisors.

## References

1. Anderson J. J. (2013). Potential health concerns of dietary phosphorus: cancer, obesity, and hypertension. *Annals of the New York Academy of Sciences*, 1301, 1–8. <https://doi.org/10.1111/nyas.12208>
2. Bird, R. P., & Eskin, N. A. M. (2021). The emerging role of phosphorus in human health. *Advances in food and nutrition research*, 96, 27–88. <https://doi.org/10.1016/bs.afnr.2021.02.001>



Acknowledgements  
This material is based upon work supported by the National Science Foundation CBET-2019435.

