

Wahlang, B., Appana, S., Falkner, K. C., McClain, C. J., Brock, G., & Cave, M. C. (2020). Insecticide and metal exposures are associated with a surrogate biomarker for non-alcoholic fatty liver disease in the National Health and Nutrition Examination Survey 2003–2004. *Environmental Science and Pollution Research International*, 27(6), 6476-6487. <https://doi.org/10.1007/s11356-019-07066-x>

Definitions

- **Non-Alcoholic Fatty Liver Disease (NAFLD):** A liver condition not caused by alcohol but by fat buildup.
- **Alanine Aminotransferase (ALT):** An enzyme that helps diagnose liver health.
- **Organochlorine Insecticides:** Chemicals used to kill insects, which persist in the environment and can be toxic.
- **Heavy Metals:** Metallic elements like lead and mercury that can be toxic in large amounts.

Key Findings

- Exposure to certain insecticides and heavy metals is linked to higher levels of ALT, suggesting a risk for NAFLD.
- The study found that lead and mercury, as well as some insecticides like dieldrin, heptachlor epoxide, and trans-nonachlor, were associated with increased odds of having elevated ALT levels.
- Obese individuals and older adults showed higher exposure levels.

Introduction

Non-alcoholic fatty liver disease (NAFLD) is common in the United States, affecting about 30% of the population. It's characterized by fat accumulation in the liver and can progress to more severe conditions. Previous studies have linked environmental pollutants to liver disease. This study aims to investigate the relationship between exposure to certain insecticides and heavy metals with elevated ALT levels, a biomarker for NAFLD, using data from the National Health and Nutrition Examination Survey (NHANES) 2003–2004.

Main Content

Background

NAFLD is a prevalent liver condition in the U.S., often associated with obesity and insulin resistance. Elevated ALT levels are used to screen for liver damage. Environmental pollutants, including heavy metals and insecticides, have been suggested to contribute to liver disease.

Methods

- **Study Design:** Cross-sectional study of NHANES 2003–2004 data.
- **Participants:** Adults without viral hepatitis, hemochromatosis, or significant alcohol consumption.
- **Pollutants Analyzed:** 111 pollutants from 17 subclasses, including lead, mercury, and various insecticides.
- **Exposure Measurement:** Pollutant levels measured in blood and urine, adjusted for lipid and creatinine levels.
- **Outcome Measurement:** ALT levels >30 IU/L for men and >19 IU/L for women.
- **Statistical Analysis:** Odds ratios for ALT elevation adjusted for age, sex, race, BMI, and insulin resistance.

Results

- **Demographics:** 4,582 participants; slightly more females than males; diverse age and BMI distribution.
- **Prevalence of ALT Elevation:** 37.6% of participants had elevated ALT, indicating possible NAFLD.
- **Pollutant Associations:**
 - **Lead and Mercury:** Higher exposure associated with increased odds of elevated ALT.
 - **Organochlorine Insecticides:** Higher levels of dieldrin, heptachlor epoxide, and trans-nonachlor linked to elevated ALT.
- **Demographic Factors:**
 - Older age and higher BMI were associated with higher pollutant levels.
 - Hispanic participants had higher prevalence of elevated ALT compared to non-Hispanic Whites and Blacks.

Conclusion

This study found that exposure to certain heavy metals and insecticides is associated with elevated ALT levels, suggesting a higher risk for NAFLD. These findings highlight the potential impact of environmental pollutants on liver health, especially among older adults and those with higher BMI. Further research is needed to confirm these associations and explore the mechanisms involved.

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