Unraveling the Metal-Water-Daphnia Nexus in Tap Water, Well Water, and Mine Creek Water: Health Effects and Natural Bio-Adsorbents for Water Quality Enhancement

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Problematic water consumption has become a pressing global issue in recent years. Despite regular filtration efforts, conventional methods often fail to remove all hazardous chemicals in water. This study highlights the urgent global issue of toxic contaminations in water and proposes an innovative solution utilizing modified carbonized pecan shells as a filtration medium, while also investigating the correlation between increased heart rate and water contaminants. Cardiovascular diseases, the world's leading cause of death according to Our World in Data, further emphasize the importance of clean water. Through experimentation, the carbonized pecan shells demonstrate promise as an efficient and affordable purification method. The research reveals that the filtration system outperforms or matches conventional filters like the PurWater Filter, significantly improving water purification by removing toxic contaminants. Moreover, it underscores the health risks posed by waterborne toxins, as evidenced by our Daphnia Magna study showing increased heart rates ($p=0.0041$) due to toxic metal contaminants like arsenic, copper, lead, and cadmium. Conversely, Post Hoc Tests show that non-filtered water vs. commercially filtered water were significant with ($p=0.0000001$); non-filtered water vs. homemade filtered water also exhibited significance with ($p=0.000001$), while the comparison between commercial and homemade filters showed no significant difference ($p=0.9965136$).

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