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Relationship Between Blood Selenium and Hypertension in Adults: A Systematic Review and Meta-Analysis

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ABSTRACT

Introduction: Hypertension is considered a global issue and associated with cardiovascular disease, stroke, and kidney failure. One of the critical risk factors for hypertension is nutrient status; selenium may affect this disorder. Studies have investigated the relationship between blood selenium and hypertension, but their results are inconsistent. We aimed to examine this relationship through a systematic review and dose-response analysis.

Search Strategy: Medline (PubMed), Scopus, Web of Science, and Google Scholar were systematically searched, by using the concepts of selenium, hypertension, and related keywords, up to December 2023, without any restrictions in publication year or language. Observational studies were included that reported blood selenium as exposure and hypertension as outcome in adults, along with relative risks (RRs), odds ratios, or hazard ratios (HRs) and 95% confidence intervals (CIs) for the relation of blood selenium and hypertension. Analyses were conducted using the random effect model. Sensitivity analysis, meta-regression and dose-response analysis were performed. All analyses were conducted using STATA version 14.0.

Results: Overall, 28,312 participants in 17 observational studies were included. The highest versus the lowest levels of circulating selenium were related to 15% higher odds of hypertension; this association was insignificant (95% CI: 0.99-1.33). Subgroup analysis based on sex indicated that highest versus the lowest blood selenium was related to a 36% higher risk of hypertension in women (95% CI: 1.03-1.81). There was no significant association observed in men (RR: 1.23; 95% CI: 0.79-1.90) or when both genders were considered together (RR: 1.02; 95% CI: 0.86-1.21). Linear dose-response analysis revealed no significant relationship between each 50 µg/L increment in blood selenium and hypertension (RR:0.99; 95% CI: 0.94-1.04). To obtain generalizable findings for the adult population, the analyses were limited to representative studies that used a random sampling method for data selection. Similar results were observed in meta-analyses and dose-response analyses of representative studies.

Conclusion and Discussion: The association between blood selenium and hypertension was found to be insignificant in both the general and representative adult populations. However, in certain subgroups, a relationship was observed, potentially due to the toxic effects of selenium. Further prospective studies are necessary to verify the relationship and to elucidate the underlying mechanisms.

Keywords: Hypertension, Meta-analysis, Selenium, Systematic review