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Double-sided effect of selenium on blood lipids:

A dose-response meta-analysis

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Background: Selenium, a trace element with both nutritional and toxicological properties, has been suggested to increase cardiovascular risk, particularly concerning diabetes and blood pressure levels. However, the impact of selenium exposure on the risk of dyslipidemia remains uncertain. This meta-analysis explored the shape of the relation between selenium exposure and its effects on lipid profiles in the most relevant experimental human studies, randomized controlled trials (RCTs).

Materials and methods: The review was registered in PROSPERO (ID: CRD42022380432). Through a bibliographic search conducted on PubMed, Web of Science, Embase, and the Cochrane Library, we identified RCTs investigating the impact of selenium supplementation on lipid profile. We then compared the results between intervention and control groups and, whenever possible, evaluated the non-linear relationship using a dose-response approach.

Results: We could include 26 RCTs involving different populations, i.e. healthy individuals, pregnant women, and subjects with health conditions such as cardiovascular diseases and Alzheimer's dementia. Study endpoints were levels of total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, and triglycerides. Our dose-response analysis indicated that selenium supplementation exceeding 200 µg/day adversely affected total cholesterol, HDL, and triglyceride levels. Hence, a threshold for such a detrimental effect of selenium was observed on total and HDL cholesterol and triglycerides, while opposite and inconsistent results emerged for levels below 200 µg/day and for LDL-cholesterol. Blood selenium levels at the end of the studies were positively associated with adverse effects on all endpoints.

Conclusions: This first dose-response meta-analysis of the effects of selenium on blood lipids highlights the potentially adverse effects of this trace element, in the amount and the chemical forms used in the trials.

Key messages:

- Elevated selenium levels correlated with adverse effects on lipid profile.
- Selenium doses exceeding 200 µg/day showed adverse effects on total and HDL cholesterol and triglycerides levels.