No evidence for an impact of selenium supplementation on environment associated health disorders: a systematic review

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CRD summary
The review aimed to determine the efficacy of selenium supplementation for environment-associated health disorders. The authors acknowledged the limited methodological quality of the included studies, and appropriately concluded that the results did not provide evidence of a beneficial effect of selenium supplementation in environmental health disorders.

Authors' objectives
To determine the efficacy of selenium supplementation for environment-associated health disorders.

Searching
AMED, BIOSIS Previews, CAB Abstracts, EMBASE, MEDLINE and the Cochrane Library were searched from inception, without any language restrictions; the search terms were reported. In addition, a search of the U.S. Dissertation Abstracts database was performed. References from 17 reviews and the primary studies within these reviews were also checked.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled clinical trials and uncontrolled studies were eligible for inclusion.

Specific interventions included in the review
Studies examining the effect of medicinal selenium supplementation above the normal dietary intake on potentially environment-associated symptoms and syndromes were eligible. Both monopreparations and complex preparations of selenium were eligible. Supplementary treatment for extreme selenium deficiency-related conditions was excluded. No dosage limit was set. However, the authors stated that dosages between 30 and 200 microg/day were considered to be therapeutically effective, with toxic or adverse effects likely with dosages exceeding 400 microg/day. Three of the included studies appeared to exceed these recommended therapeutic dosages. The majority of the included studies were of complex preparations where selenium was one component.

Participants included in the review
Individuals demonstrating clinical characteristics similar to potentially environment-associated health disorders were eligible. Potential environment-associated syndromes included: idiopathic chronic fatigue, chronic fatigue syndrome, functional memory disorder, multiple chemical sensitivity syndrome, and mucosal irritations and disorders of the eyes and respiratory tract. Confirmed exposure to contaminants was not a prerequisite.

Individuals with affective disorders, defined according to the American Psychiatric Association’s DSM-IV criteria, were included in the review, as were studies of healthy or elderly persons where the aim was prevention or treatment. Individuals with psychosomatic disorders were included only where symptoms corresponded to a clinical profile for potentially environment-associated disorders. Patients with psychotic disorders, major depressive disorders with psychotic, catatonic or melancholic features, and bipolar affective disorders were excluded, as were studies investigating the effect of selenium supplementation on the cognitive development of children. The patients in the included studies were from a variety of settings, including: out-patient departments, environmental medicine out-patient departments, medical practices, in-patient settings and nursing homes.

Outcomes assessed in the review
Studies with clinical outcome measures or surrogate parameters were eligible, although these were not specified. The outcomes in the primary studies included: muscular complaints, measures of cognition and affect (including the
Hamilton Depression Scale), anxiety, infection rates and antibiotic consumption, clinical deterioration, days absent from school due to illness, and respiratory tract infection rates.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed the primary studies; any disagreements were resolved by consensus.

Assessment of study quality
No a priori criteria were reported, although detailed comments were made on the methodological quality of the individual studies. Two reviewers independently assessed the methodological quality of the primary studies; any disagreements were resolved by consensus.

Data extraction
Two reviewers independently extracted the data from the primary studies; any disagreements were resolved by consensus. Relative risks (RRs) and confidence intervals (CIs) were calculated for binary outcomes, while mean differences with CIs were calculated for continuous outcomes.

Methods of synthesis
How were the studies combined?
The studies were individually summarised in narrative form.

How were differences between studies investigated?
Differences between the primary studies were not explicitly discussed.

Results of the review
Eleven studies (n=1,417) were included in the review: 6 RCTs, 4 non-randomised controlled studies and an observational study.

The results for each primary study were reported individually.

Seven studies (3 RCTs, 3 controlled trials and 1 uncontrolled study) found no statistically significant improvement from the intervention on environment-associated health disorder outcomes. Four studies (3 RCTs and 1 controlled study) reported a significant improvement in the selenium group compared with the controls on a number of outcomes.

The authors stated that one of the 11 studies analysed met the required standard on which recommendation for therapy might be based. This study examined the effects of long-term daily supplementation with a complex preparation of selenium on susceptibility to infections in an elderly sample. A non significant improvement compared with placebo was found for respiratory tract infections (RR 0.78, 95% CI: 0.605, 1.007) and urinary tract infections (RR 0.889, 95% CI: 0.579, 1.366).

Authors’ conclusions
The results did not provide evidence of a therapeutic benefit of selenium supplementation in environment-associated health disorders.

CRD commentary
The review question was supported by clear inclusion and exclusion criteria. Several relevant databases were searched, without language restrictions, for published articles. Grey literature was also sought, thus limiting the possibility of publication bias. Procedures implemented for the selection of primary studies, data extraction and quality assessment reduced the likelihood of reviewer error or bias at these stages. The broad range of studies included in the review precluded the pooling of data and, consequently, a narrative summary was used. However, little attempt was made to
The authors acknowledged several limitations of the evidence reviewed: the methodological quality of the included studies; heterogeneity across individual studies; the lack of consensus regarding which disorders may be considered potentially environmental health disorders; and the use of complex preparations. The authors’ conclusion, that the studies included in the review did not provide evidence of a therapeutic effect of selenium supplementation, seem appropriate.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

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