The effects of magnesium supplementation on exercise performance

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Authors' objectives
To critique research that has addressed the effects of magnesium (Mg) supplements on exercise performance in athletes.

Searching
MEDLINE was searched from 1966 to June 1999. Other electronic sources searched were CINAHL, International Bibliographic Information on Dietary Supplements, and SPORTDiscus. The reference lists of recent articles were checked.

Study selection
Study designs of evaluations included in the review
The studies included were experimental studies using magnesium supplements with performance as a dependent variable.

Specific interventions included in the review
Studies of Mg supplements as a treatment were eligible. The doses used in the included studies ranged from 116 to 500 mg/day for 1 day to 3 months. Multivitamins or minerals were ingested with the Mg in some studies. The controls were placebos.

Participants included in the review
The inclusion criteria for the participants were not specified. The reviewed studies were of males and females aged 11 to 49 years, variously described as 'healthy' or 'active'. The training status varied from untrained to triathletes.

Outcomes assessed in the review
Studies investigating exercise performance outcomes were eligible. The types of reported outcomes were strength, anaerobic-lactacid and aerobic.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Up to 10 points were awarded for each study, based on the following criteria: the use of crossover designs; how and if Mg status was assessed; whether the treatment was solely Mg supplementation; the duration of supplementation; the number of participants; and the degree of experimental control. The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Data on demographics, type of supplement, study design, results and comments were tabulated.

Methods of synthesis
How were the studies combined?
A narrative synthesis of the studies, which placed particular weight on the methodological quality assessment, was undertaken.
How were differences between studies investigated?
The studies were discussed according to confounding factors.

Results of the review
Of the 12 included studies, 11 were double-blind placebo-controlled; 3 of these were randomised and 5 involved a crossover between treatment and control. The remaining study was a single-blind time series.

The studies were limited by many confounding factors, such as the widespread failure to report Mg status, to control for exercise before testing, or to use crossover designs. There were variations in exercise models, training states and the athletes’ ages, and dosages. Other active ingredients were sometimes ingested with Mg. The populations were predominantly male and gender differences were not studied. Only 3 studies measured the typical dietary intake of Mg.

Higher quality studies found no effect of Mg supplementation, regardless of whether the type of performance outcome was strength, anaerobic-lactacid, or aerobic. The strength of evidence was equivocal for peak treadmill speed during an oxygen consumption (VO2max) test. Trained persons appeared to benefit less than untrained persons.

Authors’ conclusions
Most evidence indicated no effect of Mg supplements on performance (strength, anaerobic-lactacid, and aerobic). Previous research has been confounded by numerous factors and further study is justified.

CRD commentary
The review addressed a relevant question, but the inclusion criteria were not stated clearly. The literature search was not comprehensive and may have missed some relevant studies. Some details of how the review was conducted were missing, in particular the steps taken to avoid bias. Given the wide variations in exercise models, demographics and interventions, the detailed analysis of confounding factors and the use of quality markers to weigh the evidence was appropriate. The authors’ conclusions appear well founded, but limitations of the review should be borne in mind.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.
Research: The authors stated that little research has focused on physically active females who may be at the highest risk for Mg deficiency.

Bibliographic details

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Indexing Status
Subject indexing assigned by NLM

MeSH
Cross-Over Studies; Dietary Supplements; Exercise /physiology; Humans; Magnesium /administration & dosage /pharmacology

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.