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**File: ■ *Garcinia* spp.
■ Hydroxycitric Acid
■ Weight Loss**

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RE: Meta-analysis of *Garcinia* Extracts for Short-term Weight Loss Shows Scant Evidence; More Rigorous Studies Needed

Onakpoya I, Hung SK, Perry R, Wider B, Ernst E. The use of *Garcinia* extract (hydroxycitric acid) as a weight loss supplement: a systematic review and meta-analysis of randomised clinical trials. *J Obes.* 2011;2011:509038. doi:10.1155/2011/509038.

With the increasing prevalence of overweight and obesity, various weight management strategies have become available, including dietary supplements. *Garcinia* spp. extract (-)-hydroxycitric acid (HCA) is marketed as a weight loss supplement alone and combined with other supplements. It is a citric acid derivative found in plant species such as *G. cambogia*, *G. indica*, and *G. atroviridis*, which are native to South Asia. These authors conducted a systematic review of the literature to examine the efficacy of HCA in weight reduction.

The authors searched Medline, Embase, the Cochrane Library, AMED, and CINAHL from inception until March 2010, as well as the Internet for relevant conference proceedings. They also hand-searched relevant medical journals.

Included in the review were randomized, double-blind, placebo-controlled studies that tested the efficacy of oral HCA or any of its salts for weight reduction in obese and overweight persons. The studies had to report body weight as an outcome. The authors excluded studies that used HCA as part of a combination treatment or that did not involve obese or overweight subjects based on body mass index (BMI).

The methodological quality of all included studies was assessed by using a quality assessment checklist adapted from the Consolidated Standards of Reporting Trials (CONSORT) guidelines and the Jadad scale for assessing quality of clinical trials.

The authors identified 23 potentially relevant articles. Of those, 12 randomized clinical trials (RCTs) including 706 participants met the inclusion criteria.

The authors report that all 12 studies had one or more methodological weaknesses. None reported on how double-blinding was carried out; all were unclear about how the allocation was concealed; and only a third clearly stated the randomization procedure.

Three RCTs did not provide actual values for statistical pooling. One of those reported a nonsignificant difference in BMI or body weight between groups; one reported a significant difference in body weight ($P < 0.001$) in the HCA group compared with placebo; and a third reported a decrease in body weight and BMI from baseline for the HCA group, without providing results of intergroup differences.

Of the remaining nine RCTs, one reported a significant decrease in fat mass in the HCA group compared with placebo ($P < 0.05$), while two studies reported a significant decrease in visceral, subcutaneous, and total fat areas in the HCA group compared with placebo ($P < 0.001$). Two other studies found no significant difference in body fat loss between HCA and placebo.

The meta-analysis of the nine RCTs revealed a statistically significant difference in body weight between the HCA and placebo groups. However, the average effect size was small (about 1% in body weight loss in HCA groups compared with placebo groups) ($P = 0.05$). According to the authors, there was considerable heterogeneity among the nine trials: the treatment durations and dosages of HCA varied widely.

The authors conducted sensitivity analyses of the nine RCTs. The first included seven trials with parallel-group designs (the two crossover trials were excluded). The meta-analysis revealed a mean difference of -1.22 kg (95% confidence interval [CI]: -2.29 , -0.14).

A second meta-analysis of studies with parallel-group designs and HCA dosage ranges of 1-1.5 g daily did not reveal a significant difference in weight loss between HCA and placebo.

A third meta-analysis excluding three studies with outlying data for mean differences did not reveal a significant difference in weight loss between HCA and placebo.

A fourth meta-analysis of the two trials with good methodological quality revealed a nonsignificant difference in weight loss (mean difference: 0.88 kg; 95% CI: -0.33 , 2.10) between HCA and placebo groups.

A final meta-analysis of the change in BMI for four studies did not reveal any significant difference between HCA and placebo groups.

In most studies, no major differences in adverse events were observed between the HCA and placebo groups. Adverse events reported included headache, skin rash, common cold, and gastrointestinal symptoms.

According to the authors, these results corroborate the findings from an earlier systematic review of weight loss supplements, which reported that the weight-reducing effects of most dietary supplements is not convincing.¹

The authors caution that all of the studies included in their review had methodological issues, which likely affected the outcomes. The dosage of HCA used ranged from 1 g to

2.8 g daily. The duration of studies ranged from 2 to 12 weeks. "The failure of study investigators to adhere strictly to the CONSORT guidelines may have contributed to the variation in methodology (and heterogeneity) of the trials included in the review," write the authors.

"The evidence from RCTs suggests that *Garcinia* extracts/HCA generate weight loss on the short term. However, the magnitude of this effect is small, is no longer statistically significant when only rigorous RCTs are considered, and its clinical relevance seems questionable," conclude the authors.

—Shari Henson

Reference

¹Pittler MH, Ernst E. Dietary supplements for body-weight reduction: a systematic review. *Am J Clin Nutr.* 2004;79(4):529-536.

Referenced article is available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3010674/pdf/JOBES2011-509038.pdf>.

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