Human data

In this guide

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This is a discussion paper. It does not reflect the views of the Committee. It should not be cited.

Clinical data

133. Onakpoya *et al.*, (2010) performed a systematic review and meta-analysis of RCTs on the use of *Garcinia* extract (HCA) as a weight loss

supplement. Twenty-three eligible trials were identified of which twelve were further analysed. Nine of the twelve trials provided data for statistical pooling (see Figure 4). The dosage of HCA and the duration of the study were varied, ranging from 1-2.8 grams daily and from 2 to 12 weeks, respectively. The adverse effects reported in the RCTs included headache, skin rash, common cold, and gastrointestinal symptoms. In most of the studies there were no “major” differences in adverse events between the HCA treatment and placebo groups. Except for one trial where gastrointestinal symptoms were twice as frequent in the HCA group compared to the placebo group (Heymsfield *et al*., 1998).

Figure 4 - Results table for studies with adequate data for meta-analysis (reproduced from Onakpoya *et al*., 2011).

Author Year Country	HCA formulation	Randomised/ Analysed	Age in yrs	HCA Dosage	Treatment Duration	Baseline weight indices for HCA/placebo groups	Mean change in weight indices for HCA/placebo groups	Adverse events (AE)	Control for lifestyle factors
Hayamizu et al. 2001 Japan [24]	Tablets	40/40	37.1 ± 12.5 (HCA) 36.5 ± 10.7 (PLA)	1 g daily	8 weeks	BW: 75.6 ± 10.3/73.3 ± 10.7 BMI: 27.9 ± 1.8/27.8 ± 1.8	BW: 0 ± 11.5/0.5 ± 11.7 BMI: 0 ± 1.97/0.3 ± 2.3	No serious AE reported	Dietary control
Heymsfield et al. 1998 U.S.A. [25]	Capsules	135/135	38.6 ± 7.7 (HCA) 39.4 ± 7.2 (PLA)	1.5 g daily	12 weeks	BW: 83.8 ± 10.7/88.2 ± 13.0 BMI: 31.2 ± 2.8/31.9 ± 3.1	BW: −3.2 ± 3.3/ − 4.1 ± 3.9	Headache, URTI & GI symptoms	High fibre diet, stable physical activity levels
Kovacs et al. 2001 Netherlands [26]	Unspecified	21/21	43 ± 10 for both HCA&placebo groups	1.5 g daily	2 weeks	Mean BW: 79.3 ± 9.0 Mean BMI: 27.6 ± 2	BW: −0.4 ± 0.9/−0.5 ± 1.4	Not reported	No restriction on food intake; 1 glass of alcohol maximum daily
∗§Kovacs et al. 2001 Netherlands [27]	Unspecified	11/11	47 ± 16 for both HCA&placebo groups	1.5 g daily	2 weeks	Mean BW: 85.4 ± 25.8 Mean BMI: 27.4 ± 8.2	BW: −1.5 ± 1.66/ −1.0 ± 1.34	Not reported	No restriction on food intake; 1 glass of alcohol maximum daily
Mattes and Bormann 2000 U.S.A. [5]	Caplets	167/89	40.97 ± 10 (HCA) 44.0 ± 9.5 (PLA)	1.2 g daily	12 weeks	BW: 75.5 ± 10.2/75.8 ± 12.6 BMI: 28.3 ± 0.6/28.8 ± 0.7	BW: −3.7 ± 3.1/−2.4 ± 2.9	Not reported	Dietary control, exercise encouraged, but no formal regimen prescribed
§Preuss et al. 2004 India [29]	Unspecified	60/53	Range: 21–50	2.8 g daily	8 weeks	BW: 91.7 ± 15.7/80.4 ± 36.9 BMI: 34.7 ± 5.5/32.5 ± 2.6	BW: −4.5 ± 16.6/ −1.6 ± 34.1 BMI: −1.7 ± 5.8/ − 0.7 ± 2.74	Gas, stomach burn, headache, skin rash	Dietary control, walking exercise programme
§Preuss et al. 2004 India [6]	Unspecified	30/29	Range: 21–50	2.8 g daily	8 weeks	BW: 88.5 ± 21.8/87.4 ± 15.9 BMI: 33.6 ± 6.2/34.0 ± 4.5	BW: −5.5 ± 23.7/ −1.4 ± 17.3 BMI: −2.1 ± 6.85/ − 0.5 ± 4.8	No serious AE reported	Dietary control, walking exercise programme
Ramos et al. 1995 Mexico [30]	Capsules	40/ 35	35.3 ± 11.8 (HCA) 38.7 ± 12.3 (PLA)	1.5 g daily	8 weeks	BMI: 32.6 ± 4.3/33.2 ± 4.4	BW: −4.1 ± 1.8/−1.3 ± 0.9	Nausea, headache	Dietary control
Roongpisu-thipong et al. 2007 Thailand [2]	Sachets	50/42	40.0 ± 10.0 (HCA) 36.0 ± 10.0 (PLA)	Unclear	8 weeks	BW: 69.0 ± 5.0/65.0 ± 5.0 BMI: 27.5 ± 1.0/26.7 ± 2.5	BW: −2.8 ± 0.5/ − 1.4 ± 0.5 BMI: −0.9 ± 1.0/ − 0.6 ± 1.0	Not reported	Dietary control

Abbreviations: HCA: Hydroxycitric acid; PLA: Placebo; BW: Body Weight; BMI: Body Mass Index.
[b]Unless otherwise specified, values for age, baseline weight and mean change in weight indices have been reported as means with standard deviations.
*Studies included as crossover design, otherwise all included trials had parallel-study design.
§Studies with 3 intervention groups.

This figure shows a results table for 9 studies with adequate data for meta-analysis (reproduced from Onakpoya et al., 2011).

134. Amini *et al.*, (2024) performed a systematic review and meta-analysis of RCTs on the use of *G. cambogia* (HCA) on serum leptin concentrations. Eight studies were included in the meta-analysis (see Figure *5*). Leptin is a

peptide hormone that is produced and secreted by adipose tissue. It plays a role in appetite control, immune system modulation, insulin sensitivity, blood pressure regulation and energy homeostasis. The authors observed that several of the included studies found no adverse effects of supplementation. In one study, 38.4% of participants reported the following side effects during treatment: gastrointestinal symptoms, thirst, dizziness and diuresis with gastric discomfort being the commonly reported (Vasques *et al*., 2014). It was noted by the authors that the treatment period in the selected trials ranged from 11 days to 10 weeks and the long-term side effects of supplementation requires further evaluation as several case reports observed liver injury following *G. cambogia* supplementation.

Figure 5 - Demographic characteristics of the included studies (reproduced from Amini et al., 2024).

First Author (year)	Location	Study Design	Health status	Sex	Sample size	Duration (week)	Mean age (year)	Baseline BMI (kg/m^2)	Intervention group	Comparator group	Outcome	Assess potency of the Garcinia cambogia product used)	Assess purity of the Garcinia cambogia product used)
1. Preuss (a) (2004)	India	RCT	Healthy	Both	20	8	35.5	40.4	4667 mg/day hydroxycitric acid (HCA-SX) (60 % HCA providing 2800 mg HCA/day)	Placebo	Leptin	Yes	Yes
2. Preuss (b) (2004)	India	RCT	Healthy	Both	35	8	35.5	42.7	4667 mg/day hydroxycitric acid (HCA-SX) (60 % HCA providing 2800 mg HCA/day)	Placebo	Leptin	Yes	Yes
3. Preuss (2005)	India	RCT	Healthy	Both	54	8	35.5	33.6	4667 mg/day hydroxycitric acid (HCA-SX) (60 % HCA providing 2800 mg HCA/day)	Placebo	Leptin	Yes	Yes
4. Kovacs (2006)	Netherlands	RCT	Healthy (sedentary lean male)	Male	10	11 day	24	21.8	1447.5 mg/day HCA	Placebo	Leptin	Yes	No
5. Kim (2011)	Korea	RCT	Healthy	Both	58	10	33.9	25.4	2000 mg/day Garcinia cambogia extract (60 % HCA)	Placebo	Leptin	Yes	No
6. Lu (2012)	Taiwan	RCT	Healthy	Both	71	8	27	28.8	2800 mg/day Garcinia cambogia extract (1380.4 mg/day HCA)	Placebo	Leptin	Yes	No
7. Vasques (2014)	Brasil	RCT	Healthy	Female	43	60 day	40	32.24	2400 mg/day Garcinia cambogia extract (50 % HCA)	Placebo	Leptin	Yes	Yes
8. Tutunchi (2023)	Iran	RCT	NAFLD	Female	39	8	34	33.7	3000 mg/day HCA + Received low-calorie diet	Received low-calorie diet	Leptin	Yes	No

Abbreviations: RCT, Randomized controlled trial; BMI, Body mass index; NAFLD, Nonalcoholic fatty liver disease; HCA, Hydroxycitric acid;

This figure shows the demographic characteristics of the 8 included studies (reproduced from Amini et al., 2024).