

REVIEW

Complementary therapies for reducing body weight: a systematic review

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The prevalence of obesity is increasing at an alarming rate and a plethora of complementary therapies are on offer claiming effectiveness for reducing body weight. The aim of this systematic review is to critically assess the evidence from randomized controlled trials (RCTs) and systematic reviews of complementary therapies for reducing body weight. Literature searches were conducted on Medline, Embase, Amed, and the Cochrane Library until January 2004. Hand-searches of relevant medical journals and bibliographies of identified articles were conducted. There were no restrictions regarding the language of publication. Trial selection, quality assessment and data abstraction were performed systematically and independently by two authors. Data from RCTs and systematic reviews, which based their findings on the results of RCTs, were included. Six systematic reviews and 25 additional RCTs met our inclusion criteria and were reviewed. The evidence related to acupuncture, acupressure, dietary supplements, homeopathy and hypnotherapy. Except for hypnotherapy, *Ephedra sinica* and other ephedrine-containing dietary supplements the weight of the evidence is not convincing enough to suggest effectiveness. For these interventions, small effects compared with placebo were identified. In conclusion, our findings suggest that for most complementary therapies, the weight of the evidence for reducing body is not convincing. Hypnotherapy, *E. sinica* and other ephedrine-containing dietary supplements may lead to small reductions in body weight. However, the intake of *E. sinica* and ephedrine is associated with an increased risk of adverse events. Interventions suggesting positive effects in single RCTs require independent replication.

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Introduction

The prevalence of overweight and obesity is increasing at an alarming rate and obesity has become one of the most important avoidable risk factors for morbidity and mortality.¹ The risk of developing for instance, cancer, diabetes or heart disease increases with the degree of overweight in both men and women.^{2–5} Based on a healthy body mass index (BMI) of 18.5–24.9 kg/m², almost one-third of the US adult population must now be considered obese (BMI ≥ 30 kg/m²) and an additional third is overweight (BMI ≥ 25 kg/m²).⁶ An increase has been observed in the US prevalence of obesity from 22.9% in the National Health and Nutrition Examination Survey III (NHANES) (1988–1994) to 30.5% in NHANES 1999–2000; 64.5% of individuals in NHANES 1999–2000 were classified as overweight.⁶ In the UK, the National Audit

Office extrapolating prevalence data to 2005 suggests that levels of obesity in England could reach those experienced in the US. In 1980, 8% of women and 6% of men were classified as obese; in 1998, the prevalence had nearly trebled to 21% of women and 17% of men.⁷ The increase in obesity rates occurred more rapidly in England than in other European countries.⁸ One of the major factors responsible for the increase in prevalence figures is a decrease in energy expenditure from physical activity.^{9,10} These considerations and the notoriously poor compliance with conventional weight management programs emphasise the importance of effective, safe and acceptable therapeutic options. It is therefore hardly surprising to see the plethora of slimming aids and complementary therapies on offer, which are marketed with claims of effectiveness.¹¹ The aim of this systematic review is to critically assess whether any complementary therapy is effective for reducing body weight.

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Methods

Systematic literature searches were conducted to identify all randomized controlled trials (RCTs), systematic reviews and meta-analyses of RCTs of any type of complementary

therapy for body weight reduction. Each database was searched from its inception until January 2004: Medline (1951 to January 2004), Embase (1974 to January 2004), Amed (1985 to January 2004), The Cochrane Library (issue 1, 2004). The literature search was designed to retrieve all articles on the topic (search terms: complementary medicine, alternative medicine, acupuncture, hypnotherapy, homeopathy, homoeopathy, herbal medicine, phytotherapy, dietary supplements, overweight, obesity, weight loss, slimming and derivatives). To identify additional published or unpublished studies, we conducted hand-searches in conference proceedings (*FACT—Focus on Alternative and Complementary Therapies* 1996–2004), our own collection of papers and medical journals (*Phytomedicine* 1994–2004, *Alternative and Complementary Therapies* 1995–2004, *Erfahrungsheilkunde* 1996–2004, *Forschende Komplementärmedizin Klassische Naturheilkunde* 1994–2004). Hand-searches also included the bibliographies of all retrieved articles. There were no restrictions regarding the language of publication. Titles and abstracts of identified articles were independently assessed and hard copies of all potentially relevant articles were obtained for further evaluation (MHP, EE).

To be included, trials were required to state that they were randomized. Systematic reviews and meta-analyses were included if their results were based on the findings of RCTs. For dietary supplements, studies were additionally required to state that they were conducted double-blind or were based on double-blind trials of monopreparations. Only the most recent version of a systematic review or meta-analysis was included. Studies assessing acute effects and those testing combination preparations were excluded. Data abstraction was performed systematically and independently (MHP, EE) according to design, quality, sample size, intervention, regimen or daily dose, results, adverse events and control of lifestyle factors. Disagreements in the evaluation of studies were largely due to reading errors and were resolved through discussion.

The appraisal of the evidence was conducted using a standard scale to assess important criteria of methodological quality.¹² The quality was assessed independently by two authors (MHP, EE). This scale was also used in four of the six systematic reviews and meta-analyses. The methodological quality of the evidence was combined with the level of evidence (eg RCT, meta-analysis) and the volume of evidence to produce an indication of the weight of the evidence. Judgments took into account all of these three dimensions of weight. Thus, even if quality and level are high (eg a rigorous RCT), weight can only be considered low if there is a low volume (eg a single trial).

Results

Six systematic reviews and meta-analyses based on the results of RCTs, and 25 additional RCTs, met all inclusion criteria. The identified evidence relates to acupuncture,

acupressure, dietary supplements, homeopathy and hypnotherapy (Tables 1 and 2).

Acupuncture/acupressure

A systematic review identified four sham controlled RCTs, including one trial that assessed an acupressure device.¹³ Two of the reviewed acupuncture trials report a reduction in hunger, while two others suggest that there were no differences for body weight compared with sham acupuncture (Table 1). The systematic review concluded that claims of specific effects of acupuncture or acupressure for weight loss are not based on the results of rigorous clinical studies. Additional RCTs not mentioned in the review are presented in Table 2.^{14–16} Overall, the evidence does not convince that acupuncture or acupressure is effective for reducing body weight. This conclusion is also corroborated by a nonsystematic review.¹⁷

Dietary supplements

Ayurvedic preparations. We identified one double-blind RCT assessing ayurvedic herbal preparations.¹⁸ Included patients whose body weight was at least 20% greater than their ideal according to the Life Insurance Corporation of India received daily either indistinguishable placebo or ayurvedic preparations (Table 2) plus 750 mg *Triphala guggul*. Patients in the treatment groups experienced a reduction in body weight ranging between 7.9 and 8.2 kg, which differed significantly compared with placebo.

Chitosan

Chitosan is derived from crustaceans. It is promoted as a remedy to reduce fat absorption, which is supported by data from preclinical studies.^{19–22} However, data from a meta-analysis of five double-blind RCTs, which included patients who were described as either obese, overweight or having 10–25% excess body weight, indicated serious methodological limitations of the clinical evidence.²³ The meta-analysis concluded that the effectiveness of chitosan for body weight reduction is not established beyond reasonable doubt. For the present systematic review we identified four additional double-blind RCTs.^{24–27} Overall, the evidence suggests that there is considerable doubt that chitosan is effective for reducing body weight in humans (Tables 1 and 2). Adverse events most frequently reported included gastrointestinal symptoms such as constipation and flatulence.

Chromium picolinate

Chromium is a cofactor to insulin and has been the subject of studies assessing its effects in carbohydrate, protein and lipid metabolism.^{28–30} Reported effects include an increase in lean body mass, a decrease in percentage body fat and an increase in basal metabolic rate.^{28,31,32} Chromium picolinate

Table 1 Systematic reviews and meta-analyses of complementary therapies for reducing body weight

First author (reference)	Included studies	Intervention	Regimen daily dose	Control	Duration	N-randomized/N-analysed	Main result; mean weight loss (kg), 95% confidence interval ^a	Adverse events	Control of lifestyle factors
Ernst ¹³	RCTs	Acupuncture, acupressure	Permanent needles at ear points or daily sessions	Sham, placebo	3–12 weeks	270/not reported	No intergroup differences for body weight in two trials; compared with baseline reduction of hunger in two trials (<i>P</i> not reported)	Not reported	Not reported
Ernst ²³	Double-blind RCTs	Dietary supplements chitosan	Four tablets ^b	Placebo	4 weeks	386/366	3.3, 1.5–5.1	Nausea, flatulence	In all trials patients were advised to follow a 4200–5000 kJ per day diet
Pittler ³³	Double-blind RCTs	Dietary supplements chromium picolinate	188–924 µg	Placebo	6–14 weeks	601/516	1.1, 1.8–0.4	None	In most trials patients were instructed not to change their eating habits and exercise regularly
Shekelle ³⁶	Double-blind RCTs	Dietary supplements ephedrine	60–150 mg	Placebo	12–24 weeks	524/not reported	0.6, 0.2–1.0 per month	Psychiatric symptoms, autonomic hyperactivity, heart palpitations, hypertension, upper gastrointestinal symptoms, headache, tachycardia	Not reported
		Ephedra	72 mg	Placebo	12 weeks	189/not reported	0.8, 0.4–1.2 per month		
Pittler ⁴⁴	Double-blind RCTs	Dietary supplements guar gum	7.5–30 g	Placebo	3–24 weeks	203/192	0.04, 2.2 to –2.1	Diarrhoea, flatulence, gastrointestinal complaints	In most trials patients were instructed not to change their eating habits
Allison ⁵⁸	RCTs	Hypnotherapy	Cognitive-behavioural therapy and hypnosis	No hypnosis	Not reported	Not reported/321	Effect size 0.28, 0.23–0.33	Not reported	Not reported

^aUnless otherwise stated. ^bDose not defined in original trials.

Table 2 Randomized controlled trials with parallel group design of complementary therapies for reducing body weight

First author (reference)	Design; Jadad score	Intervention	Regimen daily dose	Control	Duration	N-randomized/ N-analysed	Result for body weight	Adverse events in intervention group	Control of lifestyle factors
Mazzoni ¹⁴	Single-blind; 2	Acupuncture	Once weekly at various points	Sham	12 weeks	40/40	No intergroup difference for body mass index ($P>0.05$)	Tibia fracture	Patients were asked to restrict their intake of saturated fats. Regular physical exercise was recommended
Sun Qingfu ¹⁵	Single-blind; 1	Acupuncture/acupressure	Ear acupressure and acupuncture at various points	<i>Oenothera erythrosepalae</i> oil	90 days	161/161	Intergroup difference ($P<0.01$)	Not reported	Patients were advised to limit their intake of sweet and fried food. Exercise was encouraged.
Steiner ¹⁶	Open; 2	Acupuncture	Once weekly for 20 min at various points	1. Sham 2. Waiting list 3. Behaviour modification	8 weeks	78/57	Intergroup difference ($P<0.05$) compared with 2. Not reported for 1 and 3	None	Patients received no dietary advice, other than 'follow your appetite if that is your custom.'
Paranjpe ¹⁸	Double-blind; 3	Ayurvedic preparations	1. Gokshuradi guggul 750 mg 2. Sinhanad guggul 300 mg 3. Chandraprabha vati 750 mg 2.4 g	Placebo	3 months	70/48	Intergroup differences for 1, 2 and 3 ($P<0.05$)	Diarrhoea, nausea	Patients received advice on diet and exercise. Dietary intake was not controlled
Wuolijoki ²⁴	Double-blind; 3	Dietary supplements chitosan		Placebo	8 weeks	51/51	No intergroup difference ($P>0.05$)	Constipation, diarrhoea, swollen heels/wrists, headache	Patients were instructed not to change their eating habits
Schiller ²⁵	Double-blind; 5	Dietary supplements chitosan	3 g	Placebo	8 weeks	69/59	Intergroup difference ($P<0.0001$)	Gastrointestinal discomfort including flatulence, stool bulkiness, bloating, nausea, heartburn Constipation	Patients were instructed not to change their eating or exercise habits
Pittler ²⁶	Double-blind; 5	Dietary supplements chitosan	2 g	Placebo	4 weeks	34/30	No intergroup difference ($P>0.05$)		Patients were instructed not to change their eating habits
Ho ²⁷	Double-blind; 3	Dietary supplements chitosan	3.1 g	Placebo	12 weeks	88/68	No intergroup difference ($P>0.05$)	Gastrointestinal symptoms	No dietary restriction
Crawford ^{32a}	Double-blind; 3	Dietary supplements chromium, niacin-bound	600 µg	Placebo	2 months	20/18	No intergroup difference ($P>0.05$)	None	Patients received dietary consultation and exercised at least three times weekly for 60 min
Heymsfield ³⁹	Double-blind; 5	Dietary supplements <i>Garcinia cambogia</i>	3 g	Placebo	12 weeks	135/135	No intergroup difference ($P=0.14$)	Headache, upper respiratory tract symptoms, gastrointestinal symptoms	Patients were provided with a high-fiber 5040 kJ per day diet plan and asked not to change exercise habits
Ramos ^b	Double-blind; NA	Dietary supplements <i>Garcinia cambogia</i>	1.5 g	Placebo	8 weeks	40/not reported	Intergroup difference ($P<0.05$)	Not reported	Patients were provided with a low fat 4200–6300 kJ per day diet
Mattes ⁴⁰	Double-blind; 4	Dietary supplements <i>Garcinia cambogia</i>	2.4 g	Placebo	12 weeks	167/89	Intergroup difference ($P=0.03$)	Not reported	Patients were advised to follow a 5000 kJ per day diet and were encouraged to exercise
Thom ⁴¹	Double-blind; 3	Dietary supplements	1.32 g	Placebo	8 weeks	60/not reported	Intergroup difference	Stomach pain	Patients were on a low fat 5000 kJ per day diet

Table 2 (continued)

First author (reference)	Design; Jadad score	Intervention	Regimen daily dose	Control	Duration	N-randomized/ N-analysed	Result for body weight	Adverse events in intervention group	Control of lifestyle factors
		<i>Garcinia cambogia</i> (hydroxycitric acid)					($P < 0.001$)		and instructed to exercise 3 times per week
Walsh ⁴³	Double-blind; 3	Dietary supplements glucomannan	3 g	Placebo	8 weeks	20/not reported	Intergroup difference ($P < 0.005$)	None	Patients were advised not to change their eating or exercise habits
Nissen ⁴⁵	Double-blind; 3	Dietary supplements β -hydroxy- β -methylbutyrate	3 g	Placebo	4 weeks	40/40	Intergroup differences for fat mass decrease and lean mass increase ($P < 0.05$)	Not reported	Patients exercised on 3 days per week
Vukovich ⁴⁶	Double-blind; 2	Dietary supplements β -hydroxy- β -methylbutyrate	3 g	Placebo	8 weeks	31/not reported	Intergroup differences for fat mass decrease ($P = 0.04$) and lean mass increase ($P = 0.06$)	Not reported	Patients exercised on 2 days per week
Rodríguez-Morán ⁴⁸	Double-blind; 4	Dietary supplements <i>Plantago psyllium</i>	15 g	Placebo	6 weeks	125/123	No intergroup difference ($P > 0.05$)	Excellent tolerance reported	Patients were advised to adhere to a 105 kJ/kg per day diet.
Kalman ⁵¹	Double-blind; 4	Dietary supplements pyruvate	6 g	Placebo	6 weeks	26/26	Intergroup difference not reported; compared with baseline ($P < 0.001$)	Not reported	Subjects exercised 3 days per week and were instructed to follow a 8400 kJ per day diet.
Kalman ⁵²	Double-blind; 3	Dietary supplements pyruvate	6 g	1. Placebo 2. No treatment	6 weeks	53/51	No intergroup difference compared with 1 and 2 ($P > 0.05$)	None	Subjects exercised 3 days per week and were instructed to follow a 8400 kJ per day diet.
Kucio ⁵³	Double-blind; 2	Dietary supplements yohimbine	20 mg	Placebo	3 weeks	20/20	Intergroup difference ($P < 0.005$)	None	Patients were advised to follow a 4200 kJ per day diet
Sax ⁵⁴	Double-blind; 4	Dietary supplements yohimbine	16–43 mg	Placebo	6 months	47/33	No intergroup difference ($P > 0.05$)	Impaired sleep, nervousness, headache, arthralgia	Patients were advised to follow a 7500 kJ per day diet and exercise three times per week
Berlin ⁵⁵	Double-blind; 2	Dietary supplements yohimbine	18 mg	Placebo	8 weeks	19/19	No intergroup difference ($P > 0.05$)	Adverse events not different to those with placebo is reported	Patients were advised to follow a 4200 kJ per day diet
Werk ⁵⁶	Double-blind; 3	Homeopathy <i>Helianthus tuberosus</i> D1	60 drops	Placebo	12 weeks	166/102	Intergroup difference ($P < 0.005$)	None	Patients were advised to refrain from extreme dieting. Patients received a 2-week nutrition plan
Schmidt ⁵⁷	Double-blind; 3	Homeopathy <i>thyroidinum</i> 30cH	5 pellets	Placebo	1 day	211/208	No intergroup difference ($P > 0.05$)	Good or very good tolerance is reported	Fasting patients were on a 670 kJ per day diet with unlimited mineral water and herbal teas
Stradling ⁶⁰	Open; 2	Hypnotherapy 1. aimed at stress reduction 2. directed at energy intake	Two 30-min sessions thereafter self-hypnosis	Dietary advice	18 months	60/46	No intergroup differences ($P > 0.05$)	Not reported	All patients received dietary advice supplemented by information material

^aCrossover design. ^bUnpublished, cited in Heymsfield³⁹, design not reported; NA = not applicable.

is an organic compound of trivalent chromium and picolinic acid. A meta-analysis included 10 double-blind RCTs (Table 1).³³ The results suggest a reduction of 1.1–1.2 kg compared with placebo during an intervention period of 6–14 weeks (ie 0.08–0.2 kg/week) in patients with an average BMI of 28–33 kg/m². It was concluded that the data suggest a small³⁴ effect compared with placebo, which has to be interpreted with caution due to the lack of robustness of the effect, which is largely dependent on a single trial. All three trials that reported on adverse events and an additional trial using niacin-bound chromium³² reported no adverse events.

E. sinica

E. sinica is an evergreen shrub native to central Asia.³⁵ Ephedrine, the primary active constituent of *E. sinica*, has been studied alone and in combination with caffeine. The most rigorous review to date assessed studies with at least 8 weeks of follow-up and concluded that *E. sinica* and ephedrine promote a small short-term weight loss of about 0.9 kg per month more than placebo (Table 1).³⁶ However, the intake is associated with an increased risk of psychiatric, autonomic or gastrointestinal symptoms and heart palpitations.³⁷ Owing to the safety concerns, the FDA has taken several regulatory actions with regard to these supplements.³⁸

Garcinia cambogia

Hydroxycitric acid is obtained from extracts of *Garcinia cambogia* and has been suggested to inhibit citrate cleavage enzyme, suppress *de novo* fatty acid synthesis and food intake.³⁹ We identified a double-blind RCT, which tested the effects of 3 g *G. cambogia* extract daily in patients with an average BMI of 32 kg/m².³⁹ The results suggest the absence of a significantly greater weight loss in the treatment group compared with the placebo group. Two further double-blind RCTs report effects in favour of treatment with *G. cambogia* compared with placebo (Ramos *et al* unpublished observations cited in Heymsfield *et al* and³⁹ Mattes *et al*⁴⁰). This is supported by a trial testing the effects of hydroxycitric acid.⁴¹ Overall, the evidence for *G. cambogia* is encouraging and further independent studies are needed. Adverse events are presented in Table 2.

Glucomannan

Glucomannan is a component of konjac root, derived from *Amorphophallus konjac*. Its chemical structure is similar to that of galactomannan from guar gum (see below) and comprises a polysaccharide chain of glucose and mannose.⁴² We identified one double-blind RCT including patients with a body weight of 20% or more over their ideal.⁴³ The report suggests significantly larger weight loss in the treatment group compared with placebo. There were no adverse events in the treatment group.

Guar gum

Guar gum is a dietary fibre derived from *Cyamopsis tetragonolobus*. Its effectiveness for lowering body weight was assessed in a meta-analysis.⁴⁴ In total, 20 double-blind, placebo-controlled RCTs were included and the data of 11 trials were analysed. The results of the meta-analysis suggest that guar gum is not effective for reducing body weight. The agreement between the included RCTs confirms the overall result of the meta-analysis. Adverse events reported in the reviewed trials predominately relate to the gastrointestinal system (Table 1).

Hydroxy-methylbutyrate

β -hydroxy- β -methylbutyrate is a metabolite of leucine that has shown anticatabolic actions through inhibiting protein breakdown. β -Hydroxy- β -methylbutyrate is available as a dietary supplement and is primarily used by bodybuilders as a supportive measure to induce body composition changes. The searches yielded two double-blind RCTs,^{45,46} which report significant differences for fat mass reduction and at least a trend towards an increase in lean body mass (Table 2). Thus, there are encouraging data for β -hydroxy- β -methylbutyrate, which require further independent replication. Both trials did not report on adverse events.

Plantago psyllium

Psyllium is a water-soluble fibre derived from the ripe seeds of *Plantago psyllium*.⁴⁷ We identified one double-blind RCT, which assessed psyllium for reducing body weight.⁴⁸ There were no significant changes in body weight in either the treatment group or the placebo group. The authors reported that psyllium was well tolerated.

Pyruvate

Pyruvate is generated in the body via glycolysis and supplementation with pyruvate seems to enhance exercise performance and improve measures of body composition.^{49,50} Two double-blind RCTs, which included patients with a BMI of 25 kg/m² and above were identified.^{51,52} None of the studies reported significantly greater effects for body weight reduction compared with placebo. One⁵¹ reported a significant body weight reduction of 1.2 kg from baseline, while both report significant reductions of fat mass and percentage body fat from baseline. Considering the evidence from rigorous clinical trials, the case of pyruvate as an aid for body composition changes and weight loss is weak. No adverse events are reported in one trial and the other did not report on adverse events (Table 2).

Yohimbine

Yohimbine, an alpha-2 receptor antagonist is the main active constituent of the ground bark of *Pausinystalia yohimbe*

(yohimbe), which is a tall evergreen tree native to Central Africa. Most clinical studies relate to the effects of this isolated constituent of yohimbe bark. We identified three relevant double-blind RCTs,^{53–55} which report conflicting results for body weight (Table 2). At present, it is unclear whether yohimbine is effective for reducing body weight. Few adverse events were reported.

Homeopathy

Two RCTs were identified which assessed homeopathic preparations (Table 2). *Helianthus tuberosus* D1 was investigated in patients with a mean BMI of 28 kg/m². After 3 months, patients in the treatment group had lost on average 7.1 kg, which was significantly different compared with patients in the placebo group.⁵⁶ In another trial, a single dose of Thyroidinum 30cH was given to fasting patients. Thyroidinum 30cH was not more effective than placebo for increasing the rate of body weight reduction.⁵⁷

Hypnotherapy

A meta-analysis included six RCTs, which compared hypnotherapy plus cognitive-behaviour therapy with cognitive-behaviour therapy alone.⁵⁸ The results suggested that the addition of hypnotherapy to cognitive-behavioural therapy leads to a relatively small reduction in body weight (Table 1). This corroborates the findings of an earlier meta-analysis, which, however, reported a larger effect size.⁵⁹ In a further RCT, hypnotherapy directed at either stress reduction or energy intake was compared with dietary advice.⁶⁰ Patients in the hypnotherapy group directed at stress reduction showed a significantly greater weight loss compared with control groups.

Discussion

Overall, the findings are encouraging in some cases but for most complementary therapies there is little convincing evidence. For hypnotherapy, *E. sinica* and chromium picolinate small effects compared with placebo were identified. For chromium picolinate, the debatable clinical relevance of the effect and the lack of robustness mean that the findings have to be interpreted with caution. For *E. sinica* and ephedrine-containing supplements an increased risk of AEs has been reported. These findings are supported by the findings of earlier reviews.^{61,65}

Lifestyle changes including dieting and regular physical exercise are the basis for successful long-term weight loss, and limited evidence exists to support the effectiveness of pharmacotherapeutic options other than orlistat and sibutramine.^{62,63} The notoriously poor compliance of conventional weight management programs and the popularity of complementary and alternative medicine have created a ready market for complementary treatment options. Data from a US survey of a random population sample of almost

15 000 adults, for instance, demonstrate the common use of nonprescription weight loss products particularly among young obese women. Interestingly, 8% of women with no excess body weight were also reported to use such products.⁶⁴

Although these treatments are popular, given the lack of convincing data on effectiveness,⁶⁵ even moderate adverse events shift the delicate risk-benefit balance against their use. There is no convincing evidence, for instance, that guar gum is more effective than placebo (Table 1), whereas adverse events such as diarrhea, nausea and flatulence were severe enough for 3% of the patients in trials included in our meta-analysis to withdraw. These findings are corroborated by other reports in the literature.^{66–68} In addition, it has been suggested that guar gum may cause possible drug interactions such as the potentiation of the effects of insulin.⁶⁹ There are similarly findings with respect to chromium picolinate (Table 1), whose data suggest risks caused by chromosome damage.⁷⁰ Other studies did not confirm these findings^{71,72} although more recently it was suggested that chromium picolinate enhances the rate of appearance of lethal mutations and female sterility in *Drosophila melanogaster*.⁷³ Two clinical cases of young men who developed acute rhabdomyolysis were linked with chromium picolinate taken as part of an exercise regimen.^{74,75} Severe renal impairment was reported in a 33-y-old woman who took chromium picolinate.⁷⁶ Another case involved a 32-y-old man, who ingested 1 mg of chromium picolinate daily for 4 days and subsequently presented with acute generalized exanthematous pustulosis.⁷⁷ Case reports are rarely conclusive evidence for establishing causality. These examples, however, indicate that risks may be involved when using complementary treatments.

We aimed to identify all RCTs, and all systematic reviews and meta-analyses based on RCTs of any complementary therapy for reducing body weight. The potential incompleteness of the citation tracking is one of the limitations of this systematic review and indeed systematic reviews in general. Although strong efforts were made to locate and retrieve all trials on the subject, it is conceivable that some were not uncovered. Restrictions of literature searches relating to the language of publications and databases are problematic. For this review we searched databases with a focus on the European and American literature and one that specializes in complementary medicine. There were no restrictions in terms of publication language. We are therefore confident that our search strategy minimized bias. The appraisal of the evidence involved a degree of judgement in some cases, and is another potential source of bias. However, we used a standard scale¹² to assess important criteria of methodological quality. This scale was also used in four of six systematic reviews and meta-analyses included in this review. The methodological quality of the trials was combined in an informal process with the type of evidence (eg, RCT, meta-analysis) and the volume of evidence to produce an indication of weight. This process of appraising the clinical

evidence was performed independently by the two reviewers, which further minimized bias.

In conclusion, our findings suggest that for most complementary therapies the weight of the evidence for reducing body is not convincing. Hypnotherapy, *E. sinica* and other ephedrine-containing dietary supplements may lead to small reductions in body weight. However, the intake of *E. sinica* and ephedrine is associated with an increased risk of adverse events. Interventions suggesting positive effects in single RCTs require independent replication.

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