

REVIEW

Acupuncture for the treatment of obesity: a review of the evidence

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Although acupuncture is being utilized to treat a variety of important health problems, its usefulness in obesity management has not yet been fully evaluated. The aim of this review paper was to survey and critically evaluate the descriptive and controlled trials of acupuncture for enhancing weight loss. The underlying principles of acupoint stimulation are described, with an emphasis on auricular (ear) acupuncture, the method most often chosen for obesity studies. The difficulties of selecting suitable placebo controls are highlighted. To date, most trials have been descriptive in nature, of short duration (≤ 12 weeks), and designed using nonstandard treatment protocols. Despite the unique challenges involved, further careful study of acupuncture's potential usefulness as an adjunct in weight management is recommended. An agenda for future research in this area is provided.

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Introduction and overview

The problem of obesity

Obesity is a serious, prevalent, and refractory problem.¹ Individuals who are overweight (BMI > 25 kg/m²) or obese (BMI > 30 kg/m²) are at greater risk for a variety of medical conditions including diabetes, hypertension, dyslipidemia, cardiovascular disease, and sleep apnea.² The psychological consequences are also severe and include body image disparagement, impaired quality of life and, among the severely obese, depression.^{3–5}

The CDC recently reported that 34% of Americans are overweight and 27% are obese.⁶ Worldwide, it is estimated that 7% of adults are obese, but two to three times as many are considered overweight.⁷ The prevalence of obesity in established market economies (Europe, Canada, Australia, etc) is estimated to be 15–20%.⁸ In developing countries, the proportion of overweight in preschool children was found to be increasing in 16 of 38 countries.⁹ A consistent finding of behavioral treatments is that one-third of the weight lost is regained 1 y after treatment, two-third after 2–3 y and full weight is regained at 5 y.^{10,11} A myriad of factors may make

efforts to control weight difficult, including unrealistic expectations,¹² genetic predisposition,¹³ an environment that promotes increased energy intake, and decreased physical activity.¹⁴

Complementary and alternative approaches

The serious, widespread and refractory nature of obesity makes it ripe for investigations of complementary and alternative approaches.^{15,16} Two broad types of approaches have been suggested. One is a complete abandonment of the dieting paradigm, often referred to as 'undieting' or 'non-dieting'.¹⁷ This movement contends that dieting is not only ineffective, it is harmful.^{18–20} This approach has not been well studied, but seems to produce favorable psychological changes (body image, depression, and self-esteem) without producing weight loss.²¹

Another broad class of complementary and/or alternative approaches has not abandoned the basic fundamentals of dieting (ie, decreasing intake) but has either decreased the intake of targeted foods (ie, reducing carbohydrates rather than total calories) or has combined traditional dieting methods with herbs, supplements or nontraditional methods such as acupuncture. Freedman *et al*²² have summarized the findings for low-fat and low-carbohydrate diets, and Allison *et al*²³ have reviewed the use of herbs and

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supplements in the treatment of obesity. However, little comprehensive information has been published relating to acupuncture in the treatment of obesity.

The focus of this review will be on acupuncture as a treatment for obesity. This paper will provide: (1) a brief overview of the methods and mechanisms of acupuncture; (2) a summary of descriptive and controlled studies of acupuncture in the treatment of obesity; and (3) an agenda for future research.

Mechanisms and methods of acupuncture

Acupuncture, practiced for several thousand years in China,²⁴ is increasingly used worldwide in the treatment of many disorders. An accumulating body of evidence summarized in a NIH Consensus Statement on Acupuncture²⁵ confirms that acupuncture treatment has beneficial effects for conditions ranging from postoperative dental pain to chemotherapy-associated emesis. It is also effective as an adjunctive modality for joint and muscle pain, addictions, and asthma.

Meridians and acupoints

In Traditional Chinese Medicine (TCM), life force or 'Qi' ('chee') is thought to circulate within energy pathways or 'meridians' longitudinally throughout the body. There are 14 major meridians, corresponding (loosely) to the Western definition of 'organs.' Acupuncture points are specific locations on the body considered to be connected to these energy meridians.²⁵⁻²⁷ During illness Qi is thought to be out of balance, and stimulation of acupuncture points corrects

this imbalance. Theoretically, an 'excess' or 'deficiency' of Qi can be 'normalized' by the specific manner of point stimulation.

Using this paradigm, obesity and/or excess appetite has been conceptualized in a variety of ways, such as 'heat' in the stomach and intestine,²⁸ a deficiency of Qi in the spleen and stomach,^{28,29} or a deficiency of primary Qi.²⁸ Based on these beliefs about the causes of obesity, a variety of acupoints are targeted in the treatment of obesity, including: Neiguan (P 6), Fenglong (St 40), Liangmen (St 21), Guanyuan (R 4), Zusanli (St 36), Tianshu (St 25), Quchi (LI 11), where P refers to a lung point, St to stomach, R to kidney, and LI to large intestine.³⁰

In terms of traditional medicine, it is believed that acupuncture works to alter central nervous system neurotransmitter levels by stimulating peripheral nerves at acupoints. These stimulated nerves then carry the signals centrally,^{31,32} shown in Figure 1, including to the spinal cord, pituitary, and midbrain. Activated centers can then release neurochemicals: endorphins, monoamines, and cortisol.³¹

Acupoint stimulation

A large number of acupuncture points (365 points have been identified in Chinese acupuncture maps) show concentrations of peripheral nerve junctions, referred to as 'trigger points'.²⁶ A variety of methods are used to stimulate acupoints.^{25,31,33} These include:

1. Needling or 'traditional acupuncture', in which fine stainless-steel needles are inserted through the skin to

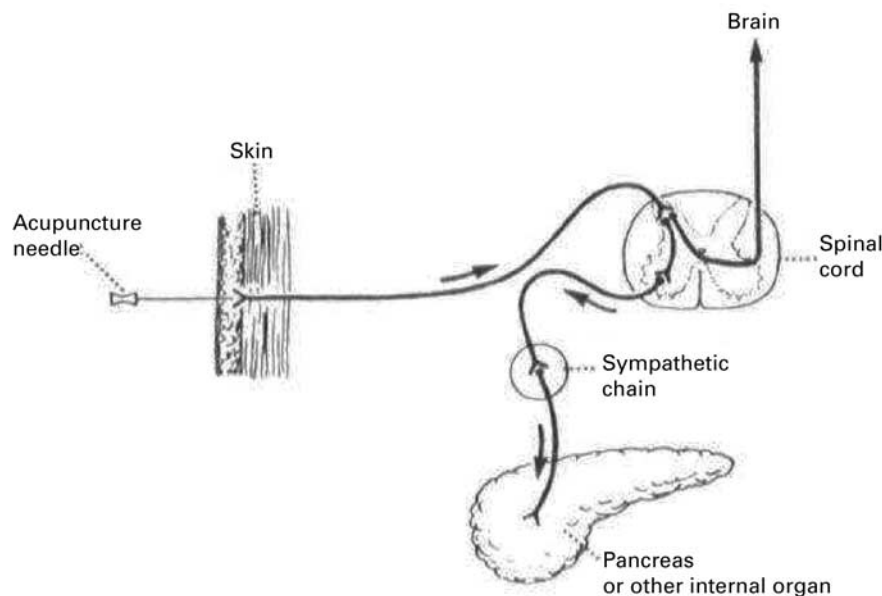


Figure 1 Simplified theoretical pathway of needle stimulation sending nerve impulses to brain and internal organ.³²

various depths, kept in place for varying lengths of time and/or further stimulated manually or electrically ('electroacupuncture').

2. Press needles or 'staple-puncture' in which short acupuncture needles are taped into place for extended periods with pressure being applied on a regular basis.
3. 'Acupressure' in which beads are massaged or pressed at specific locations.
4. 'Moxibustion' involving the application of heat, by burning small grain-sized pellets of combustible material on or near the acupoints.
5. 'Cupping' or using cups of various materials to create 'negative pressure' or a vacuum on the skin surface for increased blood circulation and point stimulation.
6. Transcutaneous electrical nerve stimulation ('TENS') which involves applying electrode pads to the skin surface which transmit a mild current into the acupoint.

Auricular acupuncture

Auricular (ear) acupuncture is the method most often used for the treatment of obesity.²⁹ Common auricular points used in the treatment of obesity include 'Hunger' and 'Stomach' points (for satiety and fullness) and 'Shenmen' (for sedation and analgesia)³⁴⁻³⁸ (Figure 2). The external ear

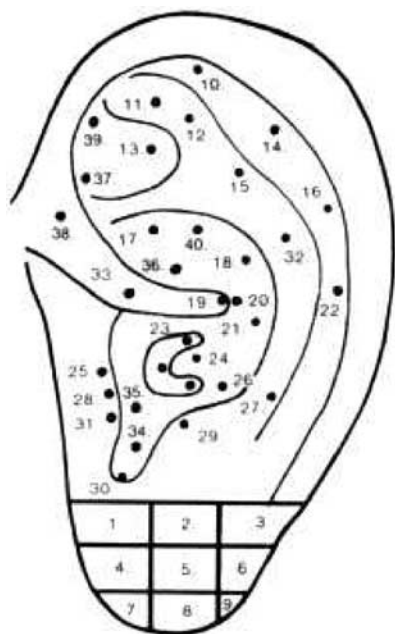


Figure 2 Acupoint-organ relationships in the ear:³⁸ 1—teeth upper jaw, 2—mouth, 3—jaw and tonsil, 4—teeth lower jaw, 5—eye, 6—inner ear, 7—teeth lower jaw, 8—tonsil, 9—inner ear, 10—foot, 11—ankle, 12—knee, 13—Shenmen-relax, 14—wrist, 15—hip, 16—elbow, 17—prostate, 18—gall bladder, 19—zero-relax, 20—stomach, 21—liver 22—shoulder, 23—lung and bronchi, 24—heart, 25—internal nose, 26—toothache, 27—neck, 28—adrenal, 29—Pingchuan-asthma, 30—endocrine, 31—hunger, 32—lumbar vertebrae, 33—diaphragm, 34—subcortex, 35—triple warmer, 36—large intestine, 37—sympathetic, 38—external genitalia 39—uterus, 40—kidney.

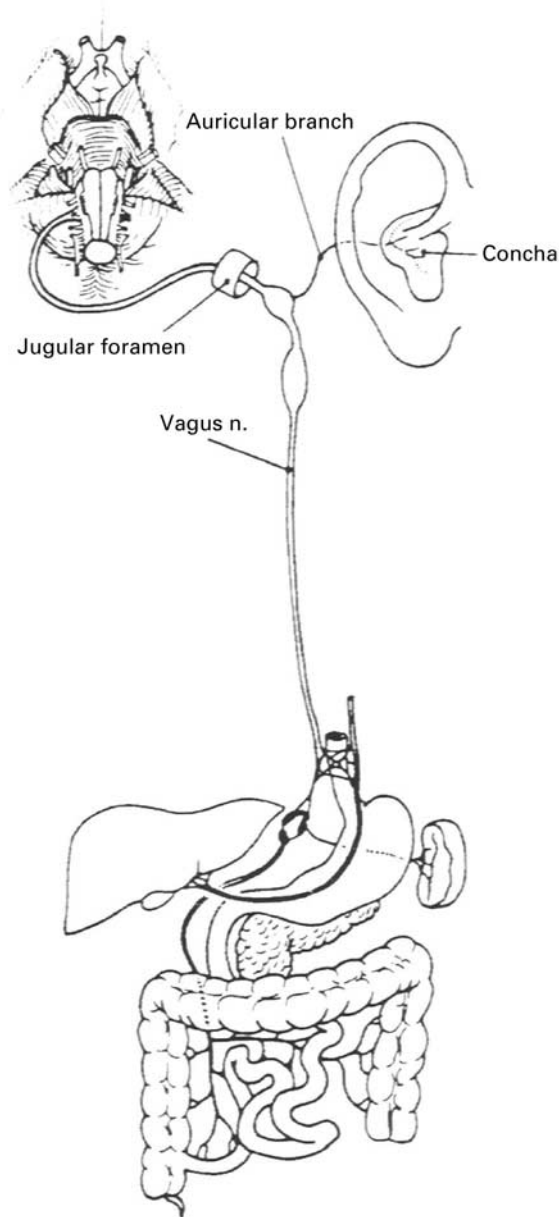


Figure 3 Scheme of distribution of the vagus nerve.⁴⁰

(auricle) is innervated by several nerves, including vagus, glossopharyngeus, trigeminus, facialis, and branches (the second and third) of the cervical spinal nerves.²⁹ The vagus nerve is thought to interact with cranial nerves and those of the digestive tract, as these nerves share a common path to the brain.³⁹ It is hypothesized that stimulation of the auricular nerve causes interference to appetite signals from the gastrointestinal tract⁴⁰ (see Figure 3).

Satiety, hunger, and appetite. Rat studies suggest that stimulation of the auricular regions—associated with the ventromedial hypothalamus—affects the satiety center and

leads to improved weight loss (or reduced gain) in both obese and nonobese rats.^{41–43} Likewise, there have been anecdotal reports of reduced appetite and cravings from patients wearing auricular acupuncture devices (press needles, staples, or beads).⁴⁰

Mood. By increasing the release of neurotransmitters,^{44–46} acupuncture may improve mood, which, in turn, might lead to improved regulation of food intake. Alternatively, acupuncture may suppress appetite by endorphin-induced decreases in stress and depression.^{47,48} The positive effects of standard acupuncture⁴⁹ and electroacupuncture⁵⁰ on mood have been observed in treating clinical depression. Given the relation between medications that are thought to alter serotonin levels and improved mood and weight loss,⁵¹ acupuncture may exert an effect by increasing serotonin levels.

Results of clinical trials with acupuncture

Uncontrolled trials

Most studies of acupuncture in the treatment of obesity have been descriptive in nature with little systematic reporting or analysis of data.^{52–54} In general, the reports from China appear to be positive with regard to the use of acupuncture for weight loss,^{55,56} reduction of cardiovascular risk factors⁵⁷ and parameters of carbohydrate metabolism (lower insulin and improved glucose control).⁵⁸ Both within and between studies, lack of standardization in the points treated and variability in the length and frequency of treatments further compromise the utility of these studies.

Beginning in the 1970s, several US studies examined the use of acupuncture alone for the treatment of obesity. Sacks⁵⁴ performed a retrospective chart review of individuals treated for drug addiction, obesity, alcoholism, and excessive smoking using ear staple puncture, plus additional acupuncture needling at a variety of body points. Among 1030 cases of obesity—treated for varying lengths of time—presented only as ‘success rates’, 25% showed excellent success, that is, weight loss of 8–10 lb/month, 50% good success (control of the eating habits and half of their individually set goal reached), while 20% were ‘not influenced at all’.

Soong⁵⁹ studied 21 obese patients using various auricular points for treatment periods ranging from 2–6 weeks and reported a mean weight loss range of 3.3 ± 1.9 kg with a range of 1–7.3 kg. All patients reported anecdotal decreases in appetite, but the data were not summarized or analyzed. Dung⁵³ treated 36 overweight individuals (27 females, nine males) using acupuncture ‘press’ needles (two needles in both ears) for 2 weeks at a time, with a 7–10 day rest period prior to the next cycle. Although few people returned for a second series of needle placements, 39% (14 of 36 patients) had lost ≥ 4 lb (range: –4 to –12 lb) in a 3-week period. The author concluded that the study results were ‘not very promising’, although the weight loss for the group as a whole

(reported as a list but not analyzed) was indeed statistically significant ($P < 0.001$).

More recently, Huang *et al*³⁴ evaluated weekly auricular acupuncture in combination with individualized dietary and aerobic exercise recommendations (so-called ‘triple therapy’) among 45 adult obese patients (8 males, 37 females). After 8 weeks, effectiveness was rated at 87% (ie, body weight and body fat reduced by at least 2 kg and 1%, respectively). The lack of a control group makes it difficult to separate the effects of diet and exercise from those of acupuncture.

Controlled trials

There are seven comparison studies of acupuncture in the treatment of obesity (Table 1). Among these seven, one has only been reported in abstract form,⁶⁰ another as a conference proceeding,³⁷ and another did not use random assignment.⁶¹

In a nonrandomized study of 120 participants (initial weight not specified), Giller⁶¹ reported that ear acupuncture press needles applied for 6 weeks resulted in ‘hunger reduction’ and weight loss (over 2 lb/week for at least 4 weeks) in 70% of patients who had been treated at the ‘hunger point’. Among participants treated at ‘stomach’, ‘lung’, or a ‘placebo’ ear point, only 20% reportedly lost weight. However, no quantitative data were presented in this report and the treatment was not consistent for all participants (eg, placement of needles was changed every 2 weeks if there had been no effect).

Sun and Xu⁶² used a standardized treatment of auricular acupressure + body acupuncture over a 90-day period in 110 subjects compared to 51 controls (randomized 2 to 1). Those in the control group received only an herbal supplement, *Oenothera erythrosepala*, evening primrose oil (1500 mg twice a day), which is high in γ -linolenic acid. The treated group had significantly greater reductions in weight (5.0 ± 2.3 vs 2.1 ± 1.6 kg; $P < 0.01$) and body fat percentage (3.0 ± 1.6 vs 1.5 ± 1.0 %; $P < 0.01$). Similarly, in an 8-week clinical trial of 14 obese women in Austria, individuals receiving diet+acupuncture (point placement not described) lost more than twice as much weight than diet-only controls (7.7 ± 4.4 vs 3.6 ± 2.2 kg; $P < 0.005$).⁶⁰

Shafshak³⁶ found that auricular electroacupuncture, administered five times a week for 3 weeks combined with a 1000-kcal/day diet, was associated with greater weight loss success ($P < 0.05$) for the obese women treated at the ‘hunger’ ($n = 10$) and ‘stomach’ ($n = 10$) ear points, compared to those treated at a placebo ($n = 10$) point. Specifically, among patients treated at the ‘hunger’ and ‘stomach’ points, 7 of 10 individuals lost 1–4 kg compared to 2 of 10 individuals in the placebo group. In this study, treating the stomach point appeared to be effective, in contrast to the results of Giller⁶¹ described above.

Steiner *et al*³⁷ randomized 78 subjects into four groups: real acupuncture (body and ear points), sham acupuncture (points near those used in real acupuncture group, but

Table 1 Controlled trials of acupuncture for enhancing weight loss

Study	Sample size ^a	Attrition	Treatment description	Point placement	Treatment frequency	Treatment length	Baseline BMI weight ^b	Post-treatment outcomes	
								Weight	Behavioral/psychosocial
Bahadori <i>et al</i> ⁶⁰	14	Not reported	Tested effect of diet/AP combination Two interventions (i) hypocaloric diet and AP; (ii) hypocaloric diet only	Not specified	Not specified	8 wks	Not reported	(i) -7.7 ± 4.4 kg (ii) -3.6 ± 2.2 kg	(i) Sig. imp. in eating behavior
Mazzoni <i>et al</i> ³⁵	40 (7 M 17.5%)	(A) 6 (30%) (B) 12 (60%)	Compared (A) AP with moxibustion to (B) placebo controls	(A) somatic and auricular AP pts (B) minimal somatic AP pts. (superficial and lateral to treatment points in A)	1x/wk	12 wks	A: 36 ± 6 kg/m ² B: 33 ± 4 kg/m ²	AP-induced wt. loss not clin. sig.; No sig. Δ in BMI in either grp.	Sig. \downarrow in BES, BDI, and STAI-1 in (A), not (B)
Shafshak 1995 ³⁶	30	Not reported	Compared 1000 kcal diet and electro AP treatment at one of three auricular points	Three grps (St) stomach, (H) hunger, (PL) placebo	25 min, 5x/wk for 3 wks	8 wks	75–99 kg	(St) -1 to -4 kg (H) -1.5 to -3.5 kg (PL) -1 and -3 kg ($n=2$) ^c ; Both (St) and (H) sig. Diff. from (P), but not w/in (St) and (H)	(St) and (H) 75% able to adhere to 3 wk diet, compared to only 20% in grp (PL)
Sun and Xu ⁶²	161 AP: 110; CTR: 51 (2 M, 1.24%)	Not reported	(AP) Auricular pellet pressure/body acupuncture treatment combination compared to controls given herbal supplement	Auricular: Mouth, Stomach, Esophagus, Abdomen, Hunger, Lung, Shenmen, Endocrine. Body: St 25, St 36, St 40, P 6, Sp 6	AP: auricle 3x/day and body 1x/ 3–5 day; CTR: supplement taken b.i.d.	12 wks	AP: 68.8 ± 6.9 kg CTR: 67 ± 8.6 kg	AP: -5.04 kg; CTR: -2.08 kg. Δ sig. greater in AP	AP: \downarrow appetite reported by 61% of patients
Steiner <i>et al</i> ³⁷	78	21 (I) 6 (II) 3 (III) 5 (IV) 6 Highest attrition in IV, lowest attrition in II	Subjects randomly assigned to one of four treatment groups: (I) Sham AP, (II) Real AP incl. auricotherapy, (III) behavior modification only, and (IV) wait listed controls	(I) Body AP: insertion location w/in, but not on, general area of pts used in (II); (II) Body AP: Li 4, St 45, Sp 5, Gb 34A and Auricular AP: Lung, Stomach, Hunger, Mouth, Internal secretions, and Shenmen	Groups (I) and (II): 20 min., 1x/wk; (III): 1 session/wk	8 wks	89.7 kg	(I) -1.2 kg (II) -2.7 kg (III) -4.3 kg (IV) $+0.5$ kg \downarrow than (IV); Δ not sig btw (II) and (III)	\downarrow Appetite reported in 100% of (II) and (III), compared to 50% in (I), and 25% in (IV)

Table 1 (continued)

Study	Sample size ^a	Attrition	Treatment description	Point placement	Treatment frequency	Treatment length	Baseline BMI weight ^b	Post-treatment outcomes	
								Weight	Behavioral/psychosocial
Mok <i>et al</i> ⁶³	24 (1M, 4%)	Not reported	Compared three combinations of auricular AP point stimulation including two active and one placebo locus using a 3 × 3 factorial design	(A) unilateral pts. mouth and stomach; (B) bilateral mouth and stomach pts; (C) ankle and shoulder (placebo)	Several min, 30 min prior to eating;	9 wks; 3 wks per locus	Not reported	No sig. Δ in weight in any group	No significant reports
Giller 1975 ⁶¹	120	Not reported	Auricular AP using press needles at four different points	Auricular points: (I)Lung, (II) Stomach, (III) Hunger, (IV) Placebo	2-3 min as needed to ↓ hunger or desire to eat	6 wks	Not specified	Not assessed	70% of those treated at Hunger point reported wt loss and ↓ hunger compared to 20% of those treated at other points

^aSubject population consists entirely of females, unless otherwise noted.

^bWeight reported as mean ± s.d.

^cOnly two of the 10 subjects in PL group followed prescribed diet.

↓ = decrease, AP = acupuncture, BDI = Beck's Depression Inventory, BES = Binge Eating Scale, b.i.d. = twice a day, btw = between, clin = clinically, CTR = control, diff = different, Gb = gall bladder, Grp = group, H = hunger, imp = improvement, Li = liver, M = male, P = pancreas, PL = placebo, pts = points, sig = significant, Sp = spleen, STAL-1 = state and anxiety inventory, State (I) score, Wk = week.

electrically inactive), behavior modification only (weekly classes on nutrition and behavior management), and wait-list controls. Data from 57 subjects after 8 weeks showed that absolute and percent weight losses in the real acupuncture group (−2.7 kg; 3.3%) were comparable to those achieved with behavior modification (−4.2 kg; 3.6%) and greater than both the 'placebo-acupuncture' (−1.2 kg; 1.2%) and wait-list control groups (+0.5 kg; 0.3% weight gain). The weight loss of both the real acupuncture and behavior modification groups differed significantly from the wait-listed controls ($P < 0.05$).

Two studies have found no effect for acupuncture. Following 3 months of weekly auricular acupuncture plus moxibustion or placebo 'minimal acupuncture' (superficial needling and lateral to the treatment points), Mazzoni *et al*³⁵ reported no differences in weight change in 40 subjects and no significant between-group changes in BMI. High and differential attrition between groups (30% in the treatment group and 60% in controls) makes this study difficult to interpret. Mok *et al*⁶³ used a 3 × 3 factorial design in 24 overweight adults to test press needles in the ear at three separate periods at three different locations (one being a 'placebo point'). None of the groups had a significant change in weight.

Alternative approaches. Several studies have examined less invasive acupuncture-related methods for weight control. Allison *et al*⁶⁴ evaluated the efficacy of an auricular acupressure device ('Acu-Stop 2000') using a randomized, controlled design in 69 subjects, all of whom received nutrition education. Treatment subjects were instructed to massage the ear with the device for a few minutes at specific times throughout the day; controls applied the device to their wrists. After 12 weeks of treatment, weight loss did not differ between groups.

Richards and Marley³⁸ assessed the efficacy of a portable, noninvasive TENS device (AcuSlim) in a 4-week randomized clinical trial of 60 subjects. In total, 95% of respondents in the treatment group, who applied the TENS to two ear points, reported appetite suppression (self-reports), compared to none of the controls, who administered the device to their thumb. None in the control group lost ≥ 2 kg, compared to 79% in the treatment group. Among individuals who lost weight (four controls and 26 treated subjects), the average weight loss was 0.6 ± 0.3 kg in the control group vs 4.0 ± 1.4 kg ($P < 0.05$) in the treatment group.

Research agenda

Unique methodological problems in acupuncture research

Acupuncture has several intrinsic challenges that are unique to its methodology: nonstandardized or individualized techniques, appropriate controls, and safety concerns.

Individualized techniques. In traditional Chinese medicine (TCM), treatment plans and acupuncture points are highly individualized, based on the location and the deficiency/excess of Qi.^{57,65} Accordingly, different set of points would be used, depending on which organ(s) needed to be 'energized' or 'inhibited'.⁶² Furthermore, acupuncture needles can be 'twirled', electrically stimulated, and left in place for variable lengths of time. There are several variations of acupuncture (eg, Japanese, French, Korean, Traditional Chinese, and English) with corresponding differences in needle penetration depth and duration, treatment focus and point selection.^{25,33} This lack of standardization makes both the design and interpretation of studies difficult.

Appropriate controls. Methodological problems⁶⁶ in obesity-related acupuncture trials include difficulties in the blinding process, finding an appropriate placebo or control mechanism, and patient expectations of acupuncture's efficacy influencing perceived or actual outcome.⁶⁷ Concealing allocation of treatment vs control is uniquely challenging.⁶⁸ When a nonacupuncture point ('sham') is used, it is possible for the treatment to be blinded by all except the acupuncturist, since a needle is applied to the same depth and for the same duration as the treatment group but in a location that has no known effect. Nevertheless, there have been studies showing that up to 50% of individuals treated by such 'sham' processes show some physiological effect, especially in studies of pain inhibition.⁶⁶ More recent placebo acupuncture has utilized 'minimal acupuncture', needling very near the treatment point, but only to a shallow depth (1–2 mm) and with only slight stimulation.⁶⁶ In addition a promising, new placebo needle has been designed with a nonpenetrating, blunt tip, held in place by a bandaid and plastic ring.⁶⁹ This placebo needle was shown to be perceived by volunteers as similar to the true penetrating acupuncture needle (also held in place via bandaid and ring),⁶⁹ and, appropriately, the placebo was significantly less effective in reducing tendinitis pain and discomfort.⁷⁰

With or without appropriate blinding and placebo controls, expectations about the credibility (usefulness and efficacy) of unconventional methods such as acupuncture may influence outcome.⁷¹ Such moderating variables may obscure real differences between groups especially in small samples. One suggested mechanism to control for patients' expectations is the treatment credibility assessment,^{66,67,72} adapted from Borkovec and Nau,⁷² which is a simple series of four questions designed to measure the individual's belief in the efficacy of treatment. Ideally, the mean scale scores should be equivalent for both treatment and control groups.

Safety issues in acupuncture. Acupuncture needles can cause local pain, inflammation, or occasional infection,^{73–78} particularly if left in place for extended period.^{73,75,76,79} Yamashita *et al*⁸⁰ prospectively evaluated 55 291 acupuncture treatments administered by acupuncturists with medical training and documented only 64 adverse

events (0.12%). All of these adverse events were minor, the most common being bruising, dizziness, perspiration, discomfort, and dermatitis. More serious complications such as infection, cardiac tamponade, spinal lesions, and pneumothorax have been reported in the literature,^{78,79,81} though none were observed by Yamashita *et al*.⁸⁰ Among a sample of 1332 practitioners in Norway (1135 doctors and 197 acupuncturists), the average rate of complications was determined to be only 0.21 complications per year for every year of (full-time) acupuncture practice.⁷⁴

Future recommendations

Adequate placebo controls. Standardized controls should be used in all future clinical trials of acupuncture treatment in obesity. Minimal acupuncture⁶⁶ and the more recently developed placebo needle⁶⁹ may be more appropriate methods to ensure validity in assessing the effectiveness of acupuncture. Credibility assessment would also help to ensure that the groups are comparable.^{67,72}

Standardized treatment. To assess accurately any potential benefits for treating obesity, the art of acupuncture must be effectively bridged with the science of evaluation. Standard algorithms need to be developed, based on principles used by practitioners, for example, criteria for selecting and changing point locations, and spacing of treatments.

Evaluate as a complementary treatment. Several randomized controlled trials have suggested that acupuncture has a positive impact on short-term weight loss. These positive effects are typically not observed when acupuncture is used in the absence of dietary and/or behavioral interventions. Therefore, future studies should include a behavioral component across conditions in order to maximize success, provide an active treatment for the controls, and decrease attrition in the comparison groups.

Long-term studies. Most of the studies to date have been of short duration, ranging from 3⁶¹ to (only one study lasting) 24 weeks,⁶⁰ with most lasting only 12 weeks.^{35,62,63} As a chronic condition, obesity is likely to require longer periods of acupuncture treatment. Acupuncture may also be considered during the maintenance phase of weight loss programs to maximize relapse prevention. In addition, attrition data at each phase of treatment would provide a more thorough evaluation of this alternative treatment.⁶⁸

Summary/conclusions

Most of the literature on acupuncture for the treatment of obesity is based on uncontrolled trials. Among the few controlled trials with positive results, the effects are modest, and the interpretation of these results is limited by those factors already mentioned, such as short duration, inadequate placebo controls, and nonstandard treatment

protocols. In light of the evidence, we believe acupuncture is a potentially useful adjunct in weight management that deserves more careful study.

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