

# ACUPUNCTURE AND OBESITY

## About obesity

**Around 60% of adults in England are either overweight or obese (DOH 2011), and 2% are morbidly obese (Body Mass Index (BMI) above 40kg/m<sup>2</sup>) (Information Centre 2008). In fact, if present trends continue, 60% of all men, 50% of all women, and 25% of all children will be obese by 2050.**

Being obese is associated with morbidity (e.g. type 2 diabetes mellitus, certain cancers, cardiovascular and musculoskeletal diseases) and premature death (Maggard 2005; Reeves 2007; Flegal 2007; Renehan 2008). Weight loss can reduce such problems and improve quality of life.

Treatment options include dietary, lifestyle and drug interventions (orlistat) and bariatric surgery (DTB 2007). The National Institute for Health and Clinical Excellence (NICE) advises that lifestyle changes should form the mainstay of management in obesity and that drug treatment should be considered only after lifestyle changes, including behavioural approaches, have been started (NICE 2006).

## References

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Less weight or more hype with rimonabant? *DTB* 2007; 45: 41. 3.

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Reeves GK et al. Cancer incidence and mortality in relation to body mass index in the Million Women Study: cohort study. *BMJ* 2007; 335: doi:10.1136/bmj.39367.495995.AE.

Renehan AG et al. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. *Lancet* 2008; 371: 569. 78.

The Information Centre, 2008. Health Survey for England 2006: latest trends [online]. Available: <http://www.ic.nhs.uk/webfiles/publications/HSE06/Health%20Survey%20for%20England%202006%20Latest%20Trends.pdf>

## How acupuncture can help

This Factsheet focuses on the evidence for acupuncture in the management of obesity.

Three systematic reviews have shown benefits with acupuncture in the management of obesity. One found it to be more effective than placebo or lifestyle modifications and as

effective as medication, but with fewer side effects (Sui 2012). Another found it to be safe and effective in the treatment of obesity and possibly more effective than medication (Lui 2009). The third concluded that acupuncture was effective for the treatment of obesity (Cho 2009). These results are promising but not conclusive, as many of the component trials have been of poor quality. Given the scale of the problem, and the shortcomings of conventional treatment options for obesity, an investment in large, high quality acupuncture trials would be welcome.

Randomised controlled trials published recently have also shown benefits with acupuncture in patients with obesity. In simple obesity, acupuncture has been found to reduce BMI more than placebo (Tong 2011), to provide increased weight loss when added to weight loss programmes with dietary measures and aerobic exercise (Yang 2010;Buevich 2010). Electroacupuncture has been shown to improve body composition in postmenopausal women with obesity (Lui 2010 and, in combination with moxibustion, has been shown to be more effective than sibutramine (Zhu 2010. Auricular acupuncture has been found to have a potential beneficial effect on obesity-related hormone peptides (Hsu 2009).

In general, acupuncture is believed to stimulate the nervous system and cause the release of neurochemical messenger molecules. The resulting biochemical changes influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being.

Research has shown that acupuncture treatment may specifically help to cause weight loss and reduce obesity by:

- Modulating serum immunoglobulin G (Cabioglu 2007);
- Lowering serum leptin and increasing adiponectin (Luo 2007; Baocun 2006);
- Lowering serum glucose and increasing insulin and c-peptide levels (Cabioglu 2006);
- stimulating alpha-melanocyte stimulating hormone expression and release (Fei 2011);
- enhancing the expression of peroxisome proliferator- activated receptor gamma mRNA in adipose tissues (PPARG is a hormone receptor gene involved in fat cell differentiation and function), activating the activities of lipoprotein lipase and hepatic lipase, and decreasing the levels of total cholesterol and low-density lipoprotein cholesterol in serum (Gao 2011);
- reducing blood lipids (triglycerides, total cholesterol, low-density lipoprotein cholesterol), fasting blood glucose levels, and expression of monocyte chemoattractant protein-1 mRNA and tumour necrosis factor -alpha mRNA (both are cytokines implicated in adipose tissue regulation), and increasing high-density lipoprotein-cholesterol (Yu 2011);
- up-regulating obestatin expression in the hypothalamus (Kong 2010).

## About the British Acupuncture Council

With over 3000 members, the British Acupuncture Council (BACc) is the UK's largest professional body for traditional acupuncturists. Membership of the BACc guarantees excellence in training, safe practice and professional conduct. To find a qualified traditional acupuncturist, contact the BACc on 020 8735 0400 or visit [www.acupuncture.org.uk](http://www.acupuncture.org.uk)

# ACUPUNCTURE AND OBESITY

## The evidence

Research	Conclusion
<b>Systematic reviews</b>	
Sui Y et al. A systematic review on use of Chinese medicine and acupuncture for treatment of obesity. <i>Obes Rev</i> 2012; doi: 10.1111/j.1467-789X.2011.00979.x. [Epub ahead of print]	A systematic review that looked at the effectiveness and safety of traditional Chinese medicine including Chinese herbal medicine (CHM) and acupuncture as an alternative established therapy for obesity. A total of 44 trials on acupuncture treatment were included. Efficacy was defined as body weight or body mass index (BMI) reduction. Compared with placebo or lifestyle modification, acupuncture exhibited a risk ratio (RR) of 2.14 (95% CI 1.58 to 2.90) in favour of body weight reduction, with a mean difference of 2.76 kg (95% CI 1.61 to 3.83) and a mean difference in BMI reduction of 2.02 (95% CI 0.94 to 3.10). Compared with the pharmacological treatments of sibutramine, fenfluramine or orlistat, acupuncture was again superior, with a body weight reduction RR of 1.14 (95% CI 1.03 to 1.25) and mean difference of 0.65kg (95% CI -0.61 to 1.91), and a BMI reduction mean difference of 0.83 (95% CI 0.29 to 1.37). The reviewers concluded that acupuncture was more effective than placebo or lifestyle modification in reducing body weight, and had a similar efficacy as conventional anti-obesity drugs but with fewer reported adverse effects. However, the low quality of many of the trials reduced the strength of these conclusions.
Lin XM et al. Systematic evaluation of therapeutic effect of acupuncture for treatment of simple obesity. <i>Zhongguo Zhen Jiu</i> 2009; 29: 856-60.	A systematic review that evaluated the therapeutic effect of acupuncture for the treatment of simple obesity. Eight randomised controlled trials involving a total of 1,017 patients were included. Meta-analyses showed that there were significant differences between acupuncture groups and western medicine groups in the effective rate (combined RR 1.11 (95% CI 1.05 to 1.18)). There was a significant difference between acupuncture and sibutramine in the body mass (combined weighted mean difference (WMD) 1.94, 95%CI 1.73 to 2.16) and BMI (combined WMD 0.52, 95% CI 0.33 to 0.70). The reviewers concluded that, for treating simple obesity, besides reasonable diet and exercise,

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acupuncture is safe and effective, and may be more effective than routine western medicine.

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Cho SH et al. Acupuncture for obesity: a systematic review and meta-analysis. 34. *Int J Obes (Lond)*. 2009 ; 33:183-96. Epub 2009 Jan 13.

A systematic review that assessed the evidence for reduction of body weight and evaluated adverse events of various types of acupuncture. In all, data from 29 randomised controlled trials involving a total of 3013 individual patients were pooled. Compared to lifestyle measures, acupuncture was associated with a significant reduction of average body weight of 1.72 kg (95% CI, 0.50 to 2.93) and an improvement in obesity (relative risk=2.57; 95% CI, 1.98 to 3.34). Compared to placebo or sham treatments, acupuncture significantly reduced body weight by 1.56 kg (95% CI 0.74 to 2.38). Acupuncture also showed more improved outcomes for body weight (mean difference=1.90 kg; 95% CI, 1.66 to 2.13), as well as for obesity (relative risk=1.13; 95% CI 1.04 to 1.22), than conventional medication. Only four RCTs reported acupuncture-related adverse events, which were mostly minimal. The reviewers concluded that their results suggest that acupuncture is an effective treatment for obesity.

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#### Randomised controlled trials

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Tong J et al. Clinical observation on simple obesity treated by acupuncture. *Zhongguo Zhen Jiu* 2011; 31: 697-701

A single-blind randomised placebo-controlled trial that evaluated the effectiveness and safety of acupuncture for simple obesity. A total of 118 patients were randomised to acupuncture or placebo, and an additional 30 healthy controls were included. After treatment, the BMI in acupuncture group was lower than that in placebo control group ( $p<0.01$ ). Serum total cholesterol and glucose after treatment were reduced significantly more in acupuncture group (all  $p<0.01$ ). Hunger sensation scores in the acupuncture group were reduced more than in the placebo group ( $p<0.05$ ). The researchers concluded that BMI in patients with simple obesity is reduced by acupuncture, as well as serum total cholesterol and glucose.

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Yang JJ et al. Effects of acupuncture combined with dietary adjustments and aerobic exercise on body weight, body mass index and serum leptin level in simple obesity patients. *Zhen Ci Yan Jiu* 2010; 35: 453-7.

A randomised controlled trial that looked at the effect of acupuncture combined with dietary adjustments and aerobic exercise on body weight, body mass index (BMI) and the serum leptin content of 61 patients with simple obesity. Patients in the control group were treated with dietary adjustments and aerobic exercise every day (30 min/d), continuously for 51 days, and those in the treatment group were treated with acupuncture plus dietary adjustment and aerobic exercise every day. Compared with pre-treatment, the body weight, BMI and serum leptin levels in the control and treatment groups all decreased significantly ( $p<0.01$ ). Comparison between the two groups showed that body weight, BMI and leptin were all significantly lower in the treatment group than in the control group ( $p<0.05$ ,  $p<0.01$ ) at the end of treatment, and that body weight and BMI were also lower at earlier intermediate points.. The researchers concluded that acupuncture combined with dietary adjustments and aerobic exercise can reduce body weight, BMI and serum leptin levels and does so more effectively than dietary adjustments plus aerobic exercise.

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<p>Lin CH et al. Electrical acupoint stimulation changes body composition and the meridian systems in postmenopausal women with obesity. <i>Am J Chin Med</i> 2010; 38: 683-94.</p>	<p>A randomised controlled trial that evaluated the effects of electroacupuncture stimulation (vs. no treatment) on body composition in 41 postmenopausal women with obesity. Body composition (weight, waist and hip circumference, percentage of body fat, and percentage of lean muscle mass) changed considerably in the acupuncture group (<math>p &lt; 0.05</math>), but there were no changes observed in the control group. The researchers concluded that their findings suggest that electroacupuncture stimulation could help to improve body composition in postmenopausal women with obesity.</p>
<p>Zhu Y et al. Clinical observation on therapeutic effect of electric-heat needle combined with acupoint sticking therapy for treatment of simple obesity. <i>Zhongguo Zhen Jiu</i> 2010; 30: 103-6.</p>	<p>A randomised controlled trial that assessed the clinical effect differences between electroacupuncture plus moxibustion and western medicine (sibutramine) for treatment of simple obesity in 121 patients. The total effective rate was 97.5% (78/80) in the acupuncture treatment group and 70.7% (29/41) in the sibutramine group, with a significant difference between the two groups (<math>p &lt; 0.05</math>). The researchers concluded that electroacupuncture plus moxibustion has a better therapeutic effect on simple obesity than sibutramine.</p>
<p>Buevich V et al. Acupuncture and psychotherapy in the complex treatment of obesity. <i>Med Acupunct</i> 2010; 22: 187-90.</p>	<p>A randomised controlled trial that evaluated the efficiency of acupuncture and psychotherapy in a comprehensive program for weight loss in 105 adult overweight women with an average body mass index (BMI) of 33.9. The control group were given a dietician's recommendations regarding diet and physical activity and were under medical observation for 2 months. In addition, 70 women received acupuncture (10 sessions) and psychotherapy (5 sessions). The weight loss in the acupuncture/psychotherapy group was significantly higher than in the control group (6.6kg vs. 2.4kg, <math>p &lt; 0.001</math>). The difference between groups in average fat mass and total body water (as % of body weight) was also significant (<math>p &lt; 0.05</math>) in favour of the acupuncture group. BMI, fat mass, and total body water were not significantly different. The researchers concluded that acupuncture may increase the efficiency of a weight loss program.</p>
<p>Hsu CH et al. The effect of auricular acupuncture in obese women: a randomized controlled trial. <i>J Womens Health</i> 2009;18: 813-8.</p>	<p>A randomised controlled trial that examined the effects of auricular acupuncture (vs. sham auricular acupuncture) in 45 obese women and looked at the relationship between the effect of auricular acupuncture and obesity-related hormone peptides. There was no statistical difference in reduction in body weight, BMI or waist circumference between the two groups after treatment. However, there was a significant increase in ghrelin level and decrease in leptin level with auricular acupuncture, while there were no significant changes in ghrelin and leptin levels in the sham group. The researchers concluded that auricular acupuncture may have potential benefit on obesity-related hormone peptides.</p>
<p>Luo HL, Li RH. Effect of electroacupuncture on leptin and adiponectin in simple obesity patients.</p>	<p>A randomised controlled trial that assessed the underlying mechanism of electroacupuncture (EA) in 60 patients with simple obesity. The patients were allocated to a control group, manual acupuncture (MA) or EA, 20 in each. Serum leptin (Lep) and</p>

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Zhen Ci Yan Jiu. 2007 Aug;32(4):264-7. adiponectin (Adi) were measured. After treatment, none in the control or MA groups, but 4 in the EA group, were cured, 10 and 14, respectively, had improved remarkably, 1, 7 and 1, respectively, had had an effective result; and 19, 3 and 1, respectively, had failed. This translated to effective rates of 5.0%, 85.0% and 95.0%, respectively, and the therapeutic effects of both MA and EA groups were significantly higher than that of control group ( $p < 0.01$ ). After treatment, serum Lep levels in both MA and EA groups decreased significantly, and serum Adi contents of these two groups increased considerably compared with their own basic values of pre-treatment ( $p < 0.05$ ,  $0.01$ ). No significant changes were found in Lep and Adi levels in control group ( $p > 0.05$ ). The effects were significantly greater with EA than with MA or in the control group ( $p < 0.05$ ). The researchers concluded that both electroacupuncture and manual acupuncture can effectively lower blood Lep content and raise blood Adi in simple obesity patients, which may contribute to its effect in reducing body weight. The effect of EA is significantly superior to that of manual acupuncture in the treatment of simple obesity.

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Baocun Y et al. Observation and Mechanism Exploration of Acupuncture on body Weight Reduction. Journal of Traditional Chinese Medicine 2006; 26: 250-3. A randomised controlled trial that looked at the mechanism of acupuncture for weight reduction. in 50 patients with obesity. Patients were divided into an electroacupuncture plus auricular-plaster therapy group and a conventional medicine (sibutramine) group. Serum leptin levels were measured before and after treatment, and the clinical therapeutic effect was evaluated. The total effective rate was 92% in the acupuncture group and 84% in the sibutramine group. Compared to pre-treatment, serum leptin levels had significantly declined after treatment in both group ( $p < 0.01$ ), and these changes were greater with acupuncture than with sibutramine ( $p < 0.05$ ). The researchers concluded that acupuncture treatment can effectively reduce the serum levels of leptin in patients with obesity, which may be one of the mechanisms for acupuncture to reduce weight.

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### Nonrandomised controlled trials

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Cabioglu MT et al. Serum IgG, IgA, IgM, and IgE levels after electroacupuncture and diet therapy in obese women. Am J Chin Med. 2007; 35: 955-65. A controlled trial that investigated the effect of acupuncture therapy on 63 obese women's body weight and peripheral blood levels of serum immunoglobulin G (IgG), immunoglobulin A (IgA), immunoglobulin M (IgM), and immunoglobulin E (IgE). The women were assigned into one of three groups: placebo electroacupuncture; diet restriction; or real electroacupuncture. There was significantly more weight loss in those in the electroacupuncture group compared to those in the diet restriction and placebo electroacupuncture groups ( $p < 0.001$ ). Modulations in serum IgG ( $p < 0.001$ ) were apparent in women treated with electroacupuncture compared with women in the other groups, but no significant changes were seen in serum IgA, IgM, and IgE levels in any of the groups. The researchers concluded that their results suggest that electroacupuncture can be effectively used to treat obesity, and that it appears to modulate the effects of serum IgG, which is associated with

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weight loss.

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Cabioglu MT, Ergene N. Changes in levels of serum insulin, C-Peptide and glucose after electroacupuncture and diet therapy in obese women. *Am J Chin Med* 2006; 34: 367-76.

A controlled study that investigated the effects of electroacupuncture (EA) therapy on body weight and levels of serum insulin, c-peptide and glucose in 52 obese women. They were allocated to one of three groups: placebo EA; EA; or diet restriction. More weight loss occurred in the EA group ( $p < 0.000$ ) compared with the diet restricted and placebo EA. There were increases in serum insulin ( $p < 0.001$ ) and c-peptide levels ( $p < 0.000$ ) with EA compared with the placebo EA and diet restriction. A decrease was observed in the glucose levels ( $p < 0.01$ ) in both the EA and diet restriction groups compared to the placebo EA group. The researchers concluded that their results suggest that EA therapy is an effective method for treating obesity, and also helps to lower serum glucose levels through the increase of serum insulin and c-peptide levels.

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### Possible mechanisms of acupuncture

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Fei W et al. Arcuate nucleus of hypothalamus is involved in mediating the satiety effect of electroacupuncture in obese rats. *Peptides* 2011 Dec; 32: 2394-9.

An animal study which found that electroacupuncture treatment acted through the arcuate nucleus of the hypothalamus to significantly inhibit food intake and body weight gain in rats fed a high-fat diet, and that the stimulation of alpha-melanocyte stimulating hormone expression and release might be involved in the mechanism.

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Gao L et al. Effects of electroacupuncture and acupoint catgut-embedding on mRNA expression of lipid metabolism gene PPAR-gamma and related lipase of rats with simple obesity. *Zhongguo Zhen Jiu* 2011; 31: 535-8.

An animal study that found electroacupuncture and acupoint catgut-embedding can regulate lipid metabolic disorders in rats with obesity by enhancing the expression of peroxisome proliferators activated receptor- gamma mRNA in adipose tissues, activating the activities of lipoprotein lipase and hepatic lipase, and decreasing the levels of total cholesterol and low-density lipoprotein cholesterol in serum.

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Yu M et al. Effect of different intensities of electroacupuncture on expression of monocyte chemoattractant protein-1 and TNF-alpha in adipose tissue in obesity rats. *Zhen Ci Yan Jiu* 2011; 36: 79-84.

An animal study that looked at the effects of different intensities of electroacupuncture (EA) on adipose tissue inflammatory cytokines in rats with simple obesity. Body weight, blood lipid (triglycerides, total cholesterol, low-density lipoprotein cholesterol), fasting blood glucose levels, and expression of monocyte chemoattractant protein-1 mRNA and tumour necrosis factor -alpha mRNA were significantly lower with electroacupuncture than in the control group ( $p < 0.01$ ), and high-density lipoprotein-cholesterol was significantly higher ( $p < 0.01$ ).

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Kong XJ et al. Effects of electro-acupuncture on expression of obestatin in hypothalamus of rats with simple obesity. *Zhong Xi Yi Jie He Xue Bao* 2010; 8: 480-5.

An animal study that found electroacupuncture reduced obesity in rats, possibly by up-regulating obestatin expression in the hypothalamus.

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