

Effect of acupuncture treatment for weight loss on gut flora in patients with simple obesity

INTRODUCTION

Acupuncture is used in the management of obesity, but the mechanisms of its action are not known. We explored the effect of abdominal acupuncture treatment on body mass index (BMI) and on intestinal flora.

MATERIALS AND METHODS

The study was approved by the Ethics Committee of Shanghai Eighth Hospital. Informed consent was obtained, and the study was based on the Standards for Reporting Interventions in Controlled Trials of Acupuncture (STRICTA) guidelines.¹

A total of 45 cases, all women, were invited from the specialist clinic for simple obesity using acupuncture at Shanghai Eighth Hospital. Cases were randomly divided into one of 3 groups: 2 treatment groups and 1 control group (15 cases each). The women ranged between 29–63 years in age, mean age $48.8 \pm \text{SD } 13.3$ years. Patients were included if they had $\text{BMI} \geq 24^2$ with no endocrine or metabolic cause. Patients with complications or who failed to

complete treatment were withdrawn. Exclusion criteria were: pregnancy or lactation; serious heart, liver, kidney, brain conditions and other serious complications of other primary diseases, mental illness, courses of antibiotics, etc.

The control group had no treatment. No dietary interventions were given for any patients. The patients in the two treatment groups were treated with acupuncture by two senior doctors, respectively, using the same points and approach. Treatment was given using abdominal and body acupuncture points for all subjects. Points were selected from CV12, CV9, BL24, BL26, ST28 and ST25, together with ST36 and SP6. After routine skin disinfection, hypodermic needles were inserted 1.5 inch in the direction of the umbilicus (abdominal points), with rotation and some degree of lift and thrust. Needles were retained for 30 min, and at 10 min and 20 min were manipulated gently. The treatment was given once every other day, 20 times for a course. The changes of BMI and faecal microbial flora in each group before and after one course were observed and recorded.

Samples for bacteriological examination was analysed by isolation and routine culture, blinded to group allocation.

Statistical analysis

The data were analysed using SPSS V.12.0 software (SPSS, Chicago, Illinois, USA). Bacteria colony-forming units (cfu) were presented as geometric averages. The total cfu value for each sample was presented as a log phase to accommodate the normal distributions. The intergroup comparison of geometric average of cfu of all bacteria was compared using two-way analysis of variance (ANOVA) analysis and Bonferroni method. Bacterial counts were compared by means of paired testing Student's t test.

RESULTS

The BMI values of the two treatment groups decreased significantly after treatment ($p < 0.05$): from 27.63 ± 1.26 to 25.38 ± 1.47 and from 27.76 ± 1.12 to 25.27 ± 1.03 , respectively. Mean BMI for the control group were 27.52 ± 1.02 (before treatment) and 27.16 ± 1.09 (after treatment). There was no significant difference between the treatment groups ($p > 0.05$).

As shown in table 1, in both treatment groups, *Lactobacillus* and *Bifidobacterium* increased after treatment but *Bacteriodes* and *Clostridium perfringens* (treatment group 1 only) decreased ($p < 0.05$). In the control group there were no statistical significant changes ($p > 0.05$).

Table 1 Gut microbiota in the log colony-forming units per/ml ($\log \text{XG} \pm \text{SD}$) from obese of treatment and control group

Type of bacteria	Treatment group 1		Treatment group 2		Control group	
	Before	After	Before	After	Before	After
Total aerobic	8.32±0.63	10.66±2.39	7.44±0.29	11.35±1.08	7.49±0.86	8.43±0.75
<i>Lactobacillus</i>	2.86±0.58	4.97±0.36*	2.13±0.98	5.37±0.25*	2.41±0.30	3.06±0.82
<i>Actinobacterium</i>	5.59±1.41	6.42±1.29	4.33±1.84	6.67±1.30	6.69±1.72	5.83±1.36
Total anaerobic	48.25±14.13	40.67±12.06	50.45±17.14	38.46±11.13	45.34±15.39	41.74±15.63
<i>Escherichia</i>	7.16±0.42	6.42±0.78	7.43±0.65	7.54±0.27	6.28±0.76	7.57±0.13
<i>Enterococcus</i>	6.02±0.96	7.26±0.35	6.92±0.27	7.73±0.18	6.34±0.67	6.21±0.89
<i>Bifidobacterium</i>	9.26±0.38	11.47±2.93*	8.49±0.66	12.50±2.65*	8.61±0.40	10.47±0.08
<i>Bacteriodes</i>	29.85±7.30	14.92±2.85*	32.51±9.37	16.35±4.22*	30.57±7.48	25.23±8.84
<i>Faecalibacterium</i>	7.17±0.48	6.81±1.72	6.80±0.75	5.34±1.67	7.68±0.46	6.18±0.54
<i>Clostridium perfringens</i>	3.58±0.97	1.60±0.33*	2.47±0.61	2.39±0.56	2.89±1.71	2.02±0.63
<i>Clostridium botulinum</i>	1.92±0.83	1.24±0.59	1.36±0.82	1.47±0.05	1.53±0.14	1.66±0.72
<i>Eubacterium</i>	3.51±0.28	3.64±0.96	2.96±0.87	2.51±0.29	3.63±0.45	3.25±0.70

*statistical significant difference between the groups before and after treatment ($p > 0.05$).

DISCUSSION

In this study, similar treatments by different clinical acupuncturists had similar effects, indicating that abdominal acupuncture has a significant effect on simple obesity regardless of the acupuncturist.

Lactobacillus and *Bifidobacterium* increased after acupuncture, but *Bacteroides* and *C. perfringens* (in treatment group 1 only) decreased. The results show that acupuncture may have an ecological role in the gastrointestinal tract, activating gastrointestinal function by adjusting the body's immune system.³ By restoring the intestinal microbial balance, acupuncture has been shown to be effective in the treatment of chronic constipation, chronic diarrhoea, acute bacillary dysentery and intestinal bowel syndrome.⁴

With regards to the possible relationship of *Bacteroidetes* in the gut to obesity, Bäckhed *et al* found that *Bacteroides* suppressed intestinal FIAF (fasting-induced adipocyte factor), which promotes adiposity. Under normal circumstances, FIAF is a member of the angiotensin-like family of proteins, which may inhibit the absorption and storage of monosaccharides as fat. Increased *Bacteroides* levels may cause the body to absorb more and become more obese.⁵ Additionally, Nagwa *et al* found that *Firmicutes* and *Bacteroidetes* are both increased in obese persons; the proportions of both were statistically significantly increased in the obese group compared to the normal weight group.⁶ However, other literature available shows that *Bacteroides* are negatively correlated with percentage of body fat and body weight.⁷ In this study, we noted the effect of acupuncture treatment on *Bacteroides*. Alteration in the ratio of *Bacteroidetes* drives a change in fermentation patterns, which may explain weight loss.

In conclusion, acupuncture may have an ecological role in the gastrointestinal tract. Alteration of *Bacteroidetes* after acupuncture treatment may be one of the mechanisms for the weight loss.

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Contributors ZX and RL were responsible for the majority of the study design, bench work and data analysis. CZ participated in the clinical sample collection and statistical analysis, and also contributed to the interpretation of the final results. ML participated in the study design, data interpretation and helped draft the manuscript. All authors read and approved the final manuscript.

Competing interests None.

Patient consent Obtained.

Ethics approval The study was approved by the Ethics Committee of Shanghai Eight People's Hospital.

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