

Original Article

Study on the clinical effect of warm acupuncture in the treatment of simple obesity complicated with dyslipidemia (spleen deficiency and dampness obstruction type) and insulin resistance

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Abstract: Objective: To evaluate the effect of warm acupuncture on simple obesity complicated with dyslipidemia (spleen deficiency and dampness obstruction type). Methods: A retrospective analysis was conducted on 100 patients with obesity and dyslipidemia treated in Henan Provincial People's Hospital from January 2022 to December 2024. Patients were divided into a control group (conventional acupuncture) and an observation group (warm acupuncture) according to their acupuncture regimen. Changes in obesity indices (body weight, body mass index [BMI], body fat percentage [F%], waist circumference [WC], hip circumference [HC]), lipid metabolism parameters (total cholesterol [TC], triglycerides [TG], low-density lipoprotein cholesterol [LDL-C], high-density lipoprotein cholesterol [HDL-C]), insulin resistance index (HOMA-IR), visceral fat index, and traditional Chinese medicine (TCM) syndrome scores were compared between the two groups. Quality of life (QoL) was assessed, and the incidence of adverse reactions was recorded. Results: Before treatment, there were no significant differences in baseline characteristics between the two groups (all $P > 0.05$). After treatment, both groups showed significant improvement in all measured indices compared to baseline levels (all $P < 0.05$). Notably, the warm acupuncture group demonstrated significantly better improvements in F%, lipid metabolism parameters, HOMA-IR, visceral fat index, TCM syndrome scores, and all domains of QoL compared with the control group (all $P < 0.05$). Although the warm acupuncture group showed a more pronounced numerical trend of reduction in waist circumference, hip circumference, body weight, and BMI, the differences in change values between the groups did not reach statistical significance ($P = 0.058, 0.077, 0.296,$ and 0.072 , respectively). There was no significant difference in the incidence of adverse reactions between the two groups ($P = 0.576$). Conclusion: Warm acupuncture is effective in treating simple obesity with dyslipidemia. It significantly improves key metabolic parameters (including body fat percentage, lipid profile, and insulin resistance), reduces TCM symptom scores, and enhances patients' quality of life, without increasing adverse reactions. While its effects on absolute weight, BMI, and circumferences warrant further investigation, warm acupuncture represents a valuable and safe therapeutic option worthy of clinical consideration.

Keywords: Simple obesity, warm acupuncture, dyslipidemia, clinical therapeutic effect, adverse reactions

Introduction

At present, the international medical community has clearly redefined obesity as a complex chronic metabolic disease. Its core pathological mechanism lies in the disorder of energy metabolism caused by the imbalance of long-term energy intake and consumption, especially closely related to abnormal lipid metabolism [1, 2]. This metabolic disorder is not only mani-

festated as excessive accumulation of adipose tissue, but also accompanied by dysfunction of adipocytes, chronic low-grade inflammation, and abnormal secretion of various adipokines, thus systematically affecting the function of multiple organs.

Epidemiological studies have further revealed the high prevalence of obesity and its extensive health hazards. Data show that the combined

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prevalence of overweight and obesity among adult Chinese residents has exceeded 50%, suggesting that obesity has become a prominent public health problem [3]. Obesity is not simply a change in body shape. As a common pathological basis for many chronic diseases, it has a clear causal relationship with insulin resistance and the occurrence and development of type 2 diabetes, non-alcoholic fatty liver disease, atherosclerotic cardiovascular disease, and even certain malignancies (e.g., breast cancer, colorectal cancer) [4]. These associations highlight the central role of obesity in the network of chronic diseases. Therefore, systematic prevention and treatment of obesity as an independent chronic disease has urgent practical significance and long-term strategic value for curbing the spread of related complications and reducing the overall burden of diseases.

At present, the treatment of obesity mainly involves pharmacological therapy aimed at reducing food intake and bariatric surgery to achieve weight reduction, both of which has achieved certain clinical effects [5, 6]. However, clinical practice indicates that long-term adherence to dietary control is often poor, and pharmacological therapies may be associated with various adverse reactions. In addition, bariatric surgery is invasive and carries potential complications, which may limit its applicability and long-term effectiveness for weight management [7]. With the development and application of traditional Chinese medicine (TCM) in clinical management of diseases, especially chronic diseases, promising therapeutic effect has been achieved. Acupuncture-based interventions, including warm acupuncture at specific acupoints, have been shown to effectively regulate energy metabolism and have been applied to the treatment of obesity. However, studies focusing on their effects on metabolic regulation and insulin resistance remain relatively limited [8, 9]. Therefore, this study aims to explore the clinical effect of warm acupuncture on obesity, lipid metabolism, and insulin resistance, in order to provide additional clinical evidence to support the comprehensive management of obesity.

Methods

General information

A retrospective analysis was conducted on patients (n = 100) with obesity complicated by

dyslipidemia treated at Henan Provincial People's Hospital between January 2022 and December 2024. These patients all received acupuncture-based treatment in the Department of Traditional Chinese Medicine, including 54 participants receiving warm acupuncture and 46 receiving conventional acupuncture. This study was approved by the Ethics Committee of Henan Provincial People's Hospital (Ethics approval number: 2025-117).

Inclusion and exclusion criteria

Inclusion criteria: 1. Age between 18 and 70 years; 2. Diagnosis of obesity according to relevant clinical guidelines [10]; 3. Completion of the entire treatment course in our hospital; 4. No medical disputes during hospitalization; 5. Complete clinical data available; 6. Abnormal blood lipid levels identified during admission examination.

Exclusion criteria: 1. Previous history of bariatric surgery; 2. History of acupuncture treatment; 3. Incomplete clinical data; 4. History of hereditary hyperlipidemia; 5. Type I/II diabetes; 6. Pregnant or lactating women.

Acupuncture method

The acupuncture protocol was standardized and described in detail below to ensure reproducibility. Disposable sterile acupuncture needles (0.30 mm × 40/50 mm) were inserted at a depth of 0.5-1.0 cun at main acupoints, including Shenshu, Pishu, Yinlingquan, Guanyuan). After achieving deqi sensation, needles were retained for 40-50 minutes. Treatment was administered once daily for the first 3 days, followed by once every other day, with 12 sessions per course. Additionally, auricular acupressure using Wangbuliuxing (Vaccaria) seeds was applied to auricular points, including the kidney and spleen points, with stimulation performed 4-6 times daily. The only difference between the warm acupuncture group and the conventional acupuncture group was the addition of moxibustion during needle retention. In the warm acupuncture group, moxa sticks (diameter ≈ 1.8 cm) were attached to needle handles at selected points (e.g., Guanyuan, Tianshu), with the burning moxa kept 3-5 cm above the skin, and each acupoint was treated for approximately 10 minutes. All other parameters - acupoint selection, needling technique, retention time, and treatment frequency - were identical between the two groups (**Figure 1**) [11].

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Figure 1. Acupuncture practice.

Data collection

General patient information was obtained from the hospital electronic medical record system, including baseline characteristics, liver and kidney function indicators, course of disease, inflammatory maker levels.

Fasting venous blood samples were collected at admission. Whole blood cell counts were determined using an automated hematology analyzer (Sysmex XN-9000) to measure white blood cell (WBC) counts. Serum interleukin-6 (IL-6) levels were detected using a chemiluminescence immunoassay (Roche Cobas e801). C-reactive protein (CRP) was measured using immunoturbidimetry (Beckman Coulter AU5800). Liver and kidney function and blood lipid profiles were analyzed using a biochemical analyzer (Roche Cobas c702). The measured indicators included alanine aminotransferase (ALT), aspartate aminotransferase (AST), total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), serum creatinine (SCr), and blood urea nitrogen (BUN). All procedures were performed in strict accordance with the standard operating procedures provided by the reagent manufacturers.

Observation indicators

Primary outcomes: General Obesity Indices: These included body weight, body mass index

(BMI), body fat percentage (BFP), waist circumference (WC), and hip circumference (HC). BFP was measured using bioelectrical impedance analysis).

Lipid Metabolism Parameters: These included TC, TG, LDL-C, and HDL-C. Venous blood samples were collected in the morning after an overnight fast and analyzed using a fully automatic biochemical analyzer.

Insulin Resistance Index: Insulin resistance was evaluated using the Homeostasis Model Assessment of Insulin Resistance (HOMA-IR). Fasting venous blood samples were collected to determine fasting plasma glucose (FPG) and fasting insulin (FINS). HOMA-IR was calculated using the formula: $HOMA-IR = [FPG (mmol/L) \times FINS (\mu U/mL)]/22.5$.

Visceral Adiposity Index (VAI): The VAI was calculated using a validated formula. Waist circumference, height, and body weight were measured in the morning after fasting, and fasting levels of TG and HDL-C were obtained. For males: $VAI = [WC (cm)/(39.68 + (1.88 \times BMI))] \times (TG (mmol/L)/1.03) \times (1.31/HDL-C (mmol/L))$. For females: $VAI = [WC (cm)/(36.58 + (1.89 \times BMI))] \times (TG (mmol/L)/0.81) \times (1.52/HDL-C (mmol/L))$.

TCM Syndrome Score [12]: The core symptoms of obesity with spleen deficiency and dampness obstruction syndrome were quantified according to the *Guiding Principles for Clinical Research of New Chinese Medicines*. The specific scoring criteria were as follows:

Obesity: 0 points for BMI < 24; 2 points for 24 ≤ BMI < 28; 4 points for 28 ≤ BMI < 32; 6 points for BMI ≥ 32.

Edema: 0 point for no edema; 2 points for mild pitting edema limited to the ankles; 4 points for obvious pitting edema in the lower limbs; 6 points for generalized pitting edema.

Heavy Limbs: 0 point for no discomfort; 2 points for occasional heaviness without affecting activities; 4 points for persistent heaviness aggravated by activity; 6 points for severe, unbearable heaviness with reluctance to move.

Fatigue/Lassitude: 0 point for no fatigue; 2 points for fatigue after exertion, able to perform daily activities; 4 points for persistent fatigue with difficulty maintaining daily activi-

ties; 6 points for extreme lassitude and lethargy preventing completion of daily activities.

The scores for each symptom were summed to obtain the total TCM syndrome score, with a maximum of 18 points. A higher score indicates more severe symptoms.

Secondary outcomes: Quality of life was assessed using the Impact of Weight on Quality of Life-Lite (IWQOL-Lite) questionnaire. This validated instrument evaluates the effects of body weight on daily functioning and well-being across multiple domains. Assessments were conducted at three time points: baseline (before treatment), immediately after treatment completion, and during follow-up period.

Therapeutic efficacy: Clinical therapeutic efficacy was evaluated based on the improvement in patients' primary symptoms and physical signs. According to the criteria established in the *Guiding Principles for Clinical Research of New Traditional Chinese Medicines* [10], therapeutic outcomes were classified into four categories: cured, markedly effective, effective, and ineffective. Total effective rate = [(Number of cured cases + Number of markedly effective cases + Number of effective cases)/Total number of cases] × 100%.

Safety outcome: The incidence of adverse reactions was documented throughout the treatment period. Recorded adverse events included local hematoma, skin burns/swelling, dizziness, fatigue, and other treatment-related discomforts.

Statistical analysis

All statistical analyses were performed using SPSS 23.0. Continuous variables were presented as mean ± standard deviation, and categorical variables were presented as numbers and percentages (%). The normality of continuous variables was assessed using the Shapiro-Wilk test. For comparisons between the two groups, independent samples t-tests were used for normally distributed continuous variables, while Mann-Whitney U tests were used for non-normally distributed data. Categorical variables were compared using the Chi-square tests or Fisher's exact tests, as appropriate. A two-sided *P*-value < 0.05 was considered statistically significant.

Sample size calculation: The sample size was initially estimated based on the primary outcome, defined as the change in body weight after treatment. Based on preliminary data and relevant literature, an expected mean difference (Δ) of 2.5 kg in weight loss between the groups and a pooled standard deviation (σ) of 3.2 kg were assumed. Using a two-sided significance level (α) of 0.05 and a statistical power ($1-\beta$) of 0.80, the minimum required sample size was calculated to be 52 participants per group.

Evaluation of statistical power with the final sample: A post-hoc power analysis was conducted using the final sample sizes ($n_1 = 54$, $n_2 = 46$) and the observed effect sizes for key outcomes (e.g., body fat percentage, *F*%). The analysis confirmed that the statistical power exceeded 0.80 for detecting the clinically relevant differences specified in the initial calculation. Furthermore, all primary analyses employed statistical methods (e.g., Analysis of Covariance, ANCOVA) that are robust to minor imbalances in group size. Therefore, while the groups are not perfectly equal, the final sample size was deemed adequate to test the study hypotheses with sufficient power.

Results

Baseline characteristics of the study population

The baseline characteristics of the 100 enrolled obese patients are presented in **Table 1**. The mean age was 52.3 ± 8.7 years in the warm acupuncture group and 51.6 ± 9.2 years in the acupuncture group ($P = 0.697$). The mean height was 163.5 ± 6.1 cm in the warm acupuncture group and 162.8 ± 5.9 cm in the acupuncture group ($P = 0.557$). Gender distribution was comparable between the two groups, with 36 males and 18 females in the warm acupuncture group and 30 males and 16 females in the acupuncture group ($P = 0.440$). Regarding the prevalence of hypertension, 20 cases (37.0%) were observed in the warm acupuncture group and 15 cases (32.6%) in the acupuncture group ($P = 0.641$). All baseline variables, including age, height, sex distribution, and hypertension prevalence, were well balanced between the two groups (all $P > 0.05$), indicating good baseline comparability.

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Table 1. Comparison of baseline characteristics between the two groups

	Warm acupuncture group (n = 54)	Conventional acupuncture group (n = 46)	x ² /t values	P value
Age (years)	52.3 ± 8.7	51.6 ± 9.2	0.391	0.697
Height (cm)	163.5 ± 6.1	162.8 ± 5.9	0.590	0.557
Sex (male/female)	36/18	30/16	0.775	0.440
Hypertension [n (%)]	20 (37.0)	15 (32.6)	0.217	0.641

Table 2. Comparison of WC and HC between the two groups before and after treatment

Group	n	Time Point	WC (cm)	t-value	P-value	HC (cm)	t-value	P-value
Conventional acupuncture group	46	Baseline	98.52 ± 10.32	-	-	104.68 ± 8.45	-	-
		Post-treatment	94.21 ± 9.67*	-	-	101.34 ± 7.89*	-	-
		Follow-up	94.05 ± 9.54	0.10	0.920	101.20 ± 7.75	0.08	0.934
Warm acupuncture group	54	Baseline	99.14 ± 11.05	-	-	105.12 ± 9.01	-	-
		Post-treatment	91.35 ± 8.92*,#	-	-	99.45 ± 7.23*,#	-	-
		Follow-up	90.87 ± 8.76	0.10	0.920	99.20 ± 7.18	0.08	0.934
Intergroup Comparison (Δ Post - Baseline)	-	-	-	1.92	0.058	-	1.79	0.077

Note: WC, waist circumference; HC, hip circumference. *P < 0.05, compared with before treatment; #P < 0.05, compared with the control group.

Table 3. Comparison of BW, BMI and F% indexes between the two groups before and after treatment and at follow-up

Group	n	Time Point	BW (kg)	t		P	BMI (kg/m ²)		F% (%)	t		P
				t	P		t	P		t	P	
Acupuncture	46	Baseline	85.87 ± 15.80	-	-	-	29.91 ± 3.52	-	-	37.20 ± 2.76	-	-
		Post-treatment	80.10 ± 14.70	8.45	< 0.001*	27.89 ± 3.20	9.12	< 0.001*	33.55 ± 2.34	11.23	< 0.001*	
		Follow-up	80.03 ± 14.59	0.05	0.963#	27.85 ± 3.18	0.08	0.939#	33.48 ± 2.66	0.15	0.882#	
Warm Acupuncture	54	Baseline	86.51 ± 15.45	-	-	-	31.47 ± 4.55	-	-	36.50 ± 4.59	-	-
		Post-treatment	78.84 ± 13.33	9.87	< 0.001*	28.70 ± 4.01	10.34	< 0.001*	31.51 ± 3.97	12.05	< 0.001*	
		Follow-up	77.86 ± 12.89	0.92	0.361#	28.35 ± 3.92	0.87	0.387#	31.01 ± 3.86	1.12	0.268#	
Inter-group comparison of Δ	-	-	-	1.05	0.296	-	1.82	0.072	-	2.15	0.034	

BW, body weight; BMI, body mass index; F%, body fat percentage. Δ: the change amplitude (post-treatment vs. baseline). *: comparison of post-treatment value with baseline value within the same group; #: comparison of follow-up value with post-treatment value within the same group.

Changes of obesity indicators in the two groups

Before treatment, there were no significant differences in baseline WC and HC between the two groups (P > 0.05). After four weeks of treatment, both WC and HC decreased significantly in each group compared with baseline (intra-group comparison, P < 0.05). However, comparison of the changes between the two groups (Δ = post-treatment value - pre-treatment value) showed that the reductions in WC (Δgroup comparison, P = 0.058) and HC (Δgroup comparison, P = 0.077) were greater in the warm acupuncture group than those in the control group, although the difference was not statistically significant.

During the follow-up period, WC and HC values in both groups remained at levels similar to those observed after treatment. Compared

with the baseline values, both indicators remained significantly improved within each group (P < 0.05). However, there were no significant differences between the two groups in WC or HC during follow-up (P > 0.05). Details are presented in **Table 2**.

Comparison of body weight, BMI, and body fat percentage (F%) between the two groups before and after treatment

As shown in **Table 3**, the changes in body weight, BMI, and body fat percentage (BFP) were compared between the two groups at baseline, after treatment, and during follow-up. At baseline, there were no significant differences in body weight, BMI, or BFP between the two groups (all P > 0.05). After treatment, all three indicators decreased significantly in both groups compared with baseline (all P < 0.001). Specifically, in the acupuncture group, body

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Table 4. Comparison of blood lipid profiles between the two groups before and after treatment

Group	n	Time Point	TC (mmol/L)	TG (mmol/L)	HDL-C (mmol/L)	LDL-C (mmol/L)
Acupuncture	46	Baseline	5.82 ± 0.97	2.14 ± 0.68	1.22 ± 0.31	3.65 ± 0.89
		Post-treatment	5.20 ± 0.85	1.78 ± 0.62	1.35 ± 0.28	3.02 ± 0.76
		t-value (P)	4.85 (< 0.001)	3.92 (< 0.001)	-3.15 (0.003)	4.62 (< 0.001)
Warm Acupuncture	54	Baseline	5.79 ± 0.94	2.11 ± 0.71	1.20 ± 0.33	3.62 ± 0.87
		Post-treatment	4.85 ± 0.78	1.56 ± 0.58	1.48 ± 0.32	2.68 ± 0.71
		t-value (P)	6.72 (< 0.001)	5.48 (< 0.001)	-5.94 (< 0.001)	7.13 (< 0.001)
		Intergroup Δ t (P)	2.15 (0.034)	2.38 (0.019)	-2.62 (0.010)	2.85 (0.005)

weight decreased from 85.87 ± 15.80 kg to 80.10 ± 14.70 kg, BMI decreased from 29.91 ± 3.52 kg/m² to 27.89 ± 3.20 kg/m², and BFP decreased from 37.20 ± 2.76% to 33.55 ± 2.34%. In the warm acupuncture group, body weight decreased from 86.51 ± 15.45 kg to 78.84 ± 13.33 kg, BMI decreased from 31.47 ± 4.55 kg/m² to 28.70 ± 4.01 kg/m², and BFP decreased from 36.50 ± 4.59% to 31.51 ± 3.97%. Intergroup comparison of the changes from baseline showed that the reduction in BFP was significantly greater in the warm acupuncture group than that in the acupuncture group (Δgroup comparison P = 0.034). However, no significant differences were observed between the two groups in the reductions of BW (P = 0.296) or BMI (P = 0.072).

During the follow-up, all indicators in both groups remained at levels similar to the post-treatment level, and significant improvements compared with baseline were maintained (intra-group comparison, P < 0.001).

Comparison of blood lipid levels between the two groups before and after treatment

Before treatment, the baseline blood lipid profiles of the two groups were comparable, with no significant difference in serum TC, TG, HDL-C and LDL-C levels between the two groups (all P > 0.05).

After treatment, the blood lipid profiles of the two groups were significantly improved compared with baseline levels. Specifically, TC (5.20 ± 0.85 vs 5.82 ± 0.97 mmol/L, P < 0.001), TG (1.78 ± 0.62 vs 2.14 ± 0.68 mmol/L, P < 0.001) and LDL-C (3.02 ± 0.76 vs 3.65 ± 0.89 mmol/L, P < 0.001) were significantly decreased, while HDL-C (1.35 ± 0.28 vs 1.22 ± 0.31 mmol/L, P = 0.003) was significantly

increased in the acupuncture group. Similarly, in the warm acupuncture group, TC (4.85 ± 0.78 vs 5.79 ± 0.94 mmol/L, P < 0.001), TG (1.56 ± 0.58 vs 2.11 ± 0.71 mmol/L, P < 0.001) and LDL-C (2.68 ± 0.71 vs 3.62 ± 0.87 mmol/L, P < 0.001) were significantly decreased, while HDL-C (1.48 ± 0.32 vs 1.20 ± 0.33 mmol/L, P < 0.001) was significantly increased.

Intergroup comparisons showed that the reductions in TC (ΔP = 0.034) and TG (P = 0.019) were significantly greater in the warm acupuncture group than those in the acupuncture group (Table 4).

Comparison of islet function, HOMA-IR, and VAI between the two groups before and after treatment

After treatment, the islet function, insulin resistance, and body composition improved in both groups. Specifically, levels of fasting C-peptide (FCP), 2-hour postprandial C-peptide (2hCP), HOMA-IR and VAI were significantly lower compared with baseline. Further intergroup comparisons between the groups showed that the reductions in these indicators were significantly greater in the warm acupuncture group than those in the conventional acupuncture group (P < 0.05; Figures 2, 3).

Comparison of TCM syndrome scores between the two groups before and after treatment

Before treatment, there were no significant differences in the TCM syndrome scores between the two groups (P > 0.05). After treatment and during follow-up period, the TCM scores in both groups significantly decreased compared with baseline values (P < 0.05), with more pronounced reductions in the warm acupuncture group than those in the conventional acupuncture group (P < 0.05; Figure 4).

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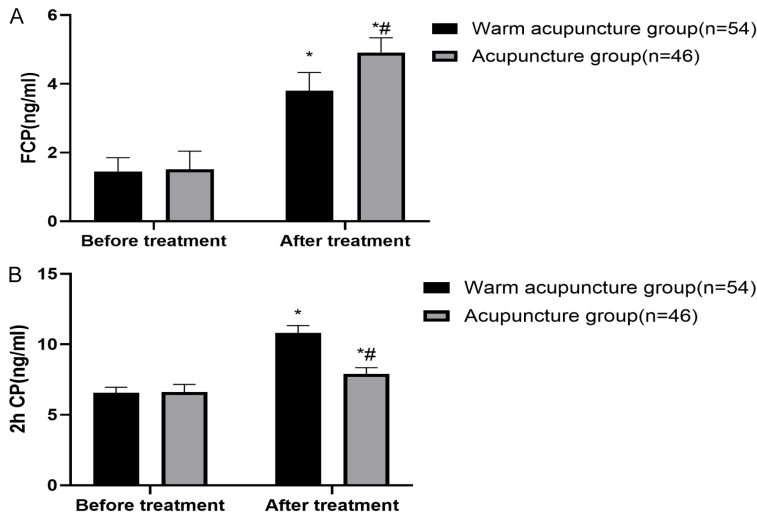


Figure 2. Comparison of FCP (A) and 2h CP (B) levels between the two groups before and after treatment. Notes: FCP, fasting C-peptide; 2h CP, 2-hour postprandial C-peptide; P < 0.05 vs. before treatment; #P < 0.05 vs. warm acupuncture group.

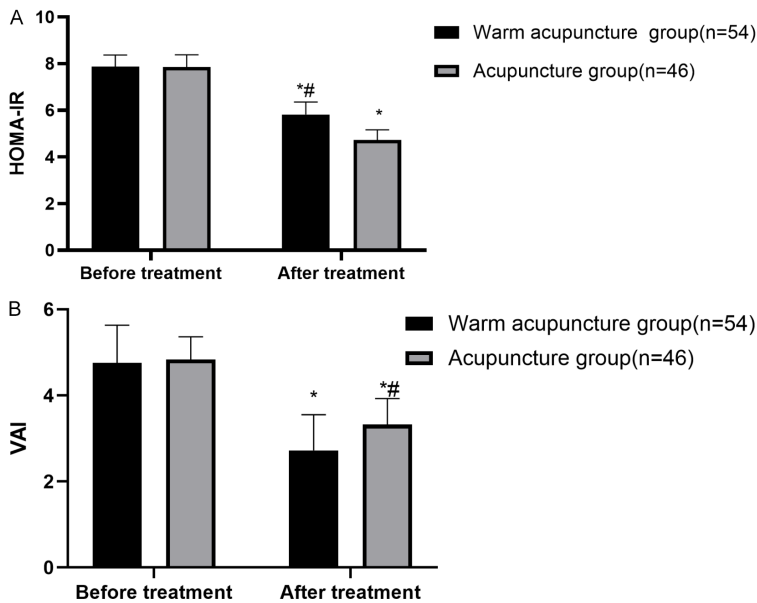


Figure 3. Comparison of HOMA-IR (A) and VAI (B) scores between the two groups before and after treatment. Notes: HOMA-IR, Homeostasis Model Assessment of Insulin Resistance; VAI, Visceral Adiposity Index; P < 0.05 vs. before treatment; #P < 0.05 vs. warm acupuncture group.

Comparison of quality of life between the two groups

Before treatment, there were no significant differences in IWQOL-Lite scores between the two groups ($P > 0.05$). After treatment and during follow-up, IWQOL-Lite scores in both groups increased significantly compared with baseline

($P < 0.05$). In addition, the IWQOL-Lite score of the warm acupuncture group was significantly higher than that in the acupuncture group ($P < 0.05$), suggesting that warm acupuncture was superior to acupuncture alone in improving patients' quality of life (Table 5).

Comparison of therapeutic effects between the two groups

After treatment, differences were observed in the distribution of clinical efficacy and the total effective rate between the warm acupuncture group and the conventional acupuncture group. The total effective rate in the warm acupuncture group was 92.6%, significantly higher than 76.1% in the conventional acupuncture group ($P = 0.022$), suggesting that warm acupuncture demonstrated superior overall clinical efficacy compared with conventional acupuncture (Table 6).

Comparison of the incidence of adverse reactions between the two groups

During the treatment, adverse reactions were observed in both group, mainly manifested as local hematoma, skin burns/swelling, dizziness, and fatigue. The total incidence of adverse reactions was 15.2% in the acupuncture group and 20.4% in the warm acupuncture group. However, there was

no significant difference between the two groups ($P > 0.05$; Table 7).

Discussion

Epidemiological investigations have indicated that profound changes in modern lifestyles, particularly the shift towards high-calorie, high-

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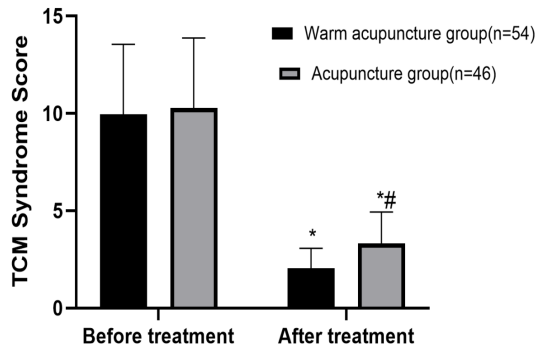


Figure 4. Comparison of TCM syndrome scores between the two groups before and after treatment. Notes: TCM, Traditional Chinese Medicine; $P < 0.05$ vs. before treatment; $\#P < 0.05$ vs. warm acupuncture group.

sugar, and high-fat dietary patterns, coupled with a significant reduction in daily physical activity, have collectively driven the increasing incidence of obesity and dyslipidemia, making them major public health concerns [13, 14]. This study demonstrates that warm acupuncture shows favorable efficacy in reducing body weight, waist and hip circumference, and body fat percentage. These results are consistent with those reported in several previous studies. For instance, Liu et al. found that acupuncture at specific acupoints (e.g., Zhongwan, Tianshu) could effectively promote weight loss by regulating leptin and adiponectin levels [15-17]. Notably, the acupoints selected in this study, such as Pishu and Yinlingquan, place greater emphasis on weight regulation from the TCM perspective that “the spleen governs transportation and transformation”. This approach differs slightly from previous studies that primarily focused on appetite suppression, suggesting a potential complementary or more foundational mechanism of action [18].

Regarding lipid metabolism, this study observed significant reductions in TC, TG, and LDL-C levels and notable increase in HDL-C following warm acupuncture treatment. These findings align with the report by Wang et al., in which moxibustion could modulate hepatic lipid metabolism pathways [19]. Furthermore, our study suggests that the combination of acupuncture and moxibustion (warm acupuncture) yielded superior lipid-lowering effects compared to acupuncture alone. This synergistic effect may be attributed to the additional “warming and unblocking” properties of moxibustion. As Zhang

et al. proposed, the thermal stimulation from moxibustion may enhance local microcirculation and metabolism, potentially facilitating the transport and clearance of lipids, which provides a plausible explanation for the observed enhancement in efficacy in this study [20-23].

In terms of alleviating insulin resistance (IR) and reducing VAI, the results of this study are consistent with the conclusions of Chen et al. [24]. We speculate that the underlying mechanism may involve several aspects. First, based on the recognized anti-inflammatory effects of acupuncture, the warm acupuncture intervention in this study may more effectively attenuate chronic low-grade inflammation in visceral adipose tissue [25]. The thermal stimulation generated by moxibustion may enhance local blood circulation, thereby facilitating the clearance of inflammatory factors. Second, our findings support the hypothesis proposed by Zhao et al. that acupuncture can activate the AMPK signaling pathway [26]. Furthermore, we observed that warm acupuncture might have a more pronounced regulatory effect on this pathway, which could partly explain its superior efficacy in improving IR and VAI compared to acupuncture alone. This also aligns with the TCM theory that “warming promotes circulation and removes obstruction”. Finally, regarding quality of life, the significant improvements observed in this study are consistent with findings from several studies on metabolic disorders [27-29]. A distinctive finding in our study is that the improvement in quality of life in the warm acupuncture group showed a significant positive correlation with the reduction in VAI, indirectly suggesting that reducing visceral fat accumulation may represent an important pathway through which warm acupuncture enhances patient well-being [30].

This study has several limitations: First, it was a single-center exploratory study with a relatively small sample size, which may introduce potential bias and limit the generalizability of the findings. Second, the follow-up period was relatively short, which precluded a comprehensive evaluation of the long-term efficacy and safety of the warm acupuncture intervention. Third, further exploration of the underlying molecular mechanisms of warm acupuncture is warranted to consolidate the evidence for its clinical effectiveness. Moreover, the study used

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Table 5. Comparison of quality of life (QoL) scores between the two groups before and after treatment and at follow-up

Group	Time Point	Total Score	Body Function	Self-esteem/Social	Sex Life	Pressure in Public	Work	
Acupuncture	Baseline	45.3 ± 8.7	12.5 ± 3.2	9.8 ± 2.5	7.1 ± 1.9	8.9 ± 2.1	7.0 ± 1.8	
	Post-treatment	58.6 ± 9.2*	16.8 ± 3.5*	13.2 ± 2.9*	9.5 ± 2.3*	11.5 ± 2.4*	9.6 ± 2.1*	
	Follow-up	57.9 ± 8.5*	16.5 ± 3.3*	13.0 ± 2.8*	9.3 ± 2.2*	11.3 ± 2.3*	9.5 ± 2.0*	
Warm Acupuncture	Baseline	44.8 ± 9.1	12.3 ± 3.4	9.6 ± 2.7	6.9 ± 2.0	8.7 ± 2.3	6.9 ± 1.9	
	Post-treatment	65.4 ± 10.1*	18.9 ± 3.8*	15.5 ± 3.1*	11.2 ± 2.5*	13.2 ± 2.7*	11.3 ± 2.4*	
	Follow-up	64.8 ± 9.6*	18.7 ± 3.7*	15.3 ± 3.0*	11.0 ± 2.4*	13.0 ± 2.6*	11.1 ± 2.3*	
Between-group Comparison (After treatment)		t-value	3.52	2.95	3.84	3.65	3.21	3.78
		P-value	0.001	0.004	< 0.001	< 0.001	0.002	< 0.001

*P < 0.05, compare with baseline value.

Table 6. Comparison of clinical efficacy between the two groups

Group	n	Cure (A)	Markedly Effective (B)	Effective (C)	Ineffective (D)	Total Effective Rate (A+B+C)
Acupuncture	46	5 (10.9%)	12 (26.1%)	18 (39.1%)	11 (23.9%)	35 (76.1%)
Warm Acupuncture	54	9 (16.7%)	20 (37.0%)	21 (38.9%)	4 (7.4%)	50 (92.6%)
χ ² value		0.72	1.36	0.001	6.54	5.28
P value		0.395	0.244	0.970	0.011	0.022

Table 7. Comparison of adverse reactions between the two groups of patients

Groups	Number of cases	Local hematoma	Skin burns/redness	Dizziness/fatigue	Other	Total incidence of adverse reactions
Acupuncture group	46	3 (6.5%)	1 (2.2%)	2 (4.3%)	1 (2.2%)	7 (15.2%)
Warm acupuncture group	54	4 (7.4%)	2 (3.7%)	3 (5.6%)	2 (3.7%)	11 (20.4%)

conventional acupuncture as the control intervention, rather than first-line treatments such as lifestyle modification or lipid-lowering pharmacotherapy. Therefore, direct conclusions regarding the comparative efficacy of warm acupuncture relative to standard care cannot be drawn. Furthermore, while warm acupuncture showed superior improvements in certain metabolic parameters compared to conventional acupuncture, its incremental benefit over routine clinical management was not quantified. Future studies should include active comparators based on standard-of-care interventions to better clarify the clinical positioning and cost-effectiveness of warm acupuncture.

Conclusion

Warm acupuncture for the treatment of simple obesity complicated by dyslipidemia can improve lipid metabolism, promote weight reduction, decrease TCM syndrome scores, and

enhance patients' quality of life, without increasing treatment-related adverse reactions.

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Disclosure of conflict of interest

None.

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