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Review Article

Acupuncture and moxibustion as effective treatments for simple obesity in children: a meta-analysis

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Abstract: Objective: To systematically review published studies on the application of acupuncture and moxibustion in the treatment of simple obesity in children and evaluate its effectiveness. Methods: A comprehensive search was conducted in the Wanfang, CNKI, Chinese Biomedical Literature, VIP, Embase, PubMed, Cochrane Library, and Web of Science for studies on the effects of acupuncture and moxibustion in treating simple obesity in children, published between December 2003 and October 2024. Primary clinical outcomes included blood lipids, fasting blood glucose, fasting insulin, weight-related indicators, clinical effects, leptin, body fat-related indicators, and traditional Chinese medicine (TCM) syndromes. Data were extracted and summarized, and a meta-analysis was performed using Revman 5.3 software and Stata 13.1. Results: A total of 20 studies met the inclusion criteria, all involving acupuncture and moxibustion therapy. Compared with the control group, acupuncture and moxibustion significantly reduced total cholesterol (TC) (SMD = -0.53; 95% CI: -0.95 to -0.12, P<0.0001, I^2 = 87.3%), triglyceride (TG) (SMD = -0.27; 95% CI: -0.54 to -0.01, P = 0.002, I^2 = 66.7%), and fasting blood glucose levels (SMD = -0.61; 95% CI: -1.08 to -0.13, I^2 = 82.2%, P = 0.001). Compared to metformin group, semaglutide combined with metformin led to significant reductions in body mass indexes (BMI) (SMD = -0.49, 95% CI: -0.80 to -0.18, I^2 = 81%). Additionally, acupuncture treatment resulted in a decrease in TCM syndrome scores compared to control therapy (SMD = -1.49; 95% CI = -2.73 to 0.25; I^2 = 96.4%, P<0.0001). Conclusion: Acupuncture and moxibustion treatment for simple obesity in children significantly reduced fasting blood glucose, waist circumference, TCM syndromes score, BMI and lipid levels.

Keywords: Acupuncture and moxibustion, simple obesity, children, meta-analysis

Introduction

Currently, the global prevalence of obesity, including that in China, is rising annually, with a noticeable trend toward younger ages. The problem of obesity and overweight in children and adolescents has become increasingly severe [1]. According to a report by the World Health Organization in The Lancet, in 1975, less than 1% of children and adolescents (aged 5-19 years) globally were obese, with approximately 5 million girls and 6 million boys affected. By 2016, the number had increased tenfold over 40 years, reaching 50 million girls and 74 million boys, with obesity rates close to 6% in girls and 8% in boys [2]. Data from the Chinese government indicate that 10.4% of children under 6 years old and 19.0% of children aged 6-17 years are overweight or obese, with some areas reporting rates as high as 40% [3]. Obesity leads to metabolic disorders and is a significant risk factor for early sexual maturity, hyperuricemia, and other health issues in children [4, 5]. It negatively impacts their growth, final height, and increases the risk of chronic diseases and accidental injuries, affecting their physical and mental health, development, fertility, work capacity, social adaptation, disease burden, and life expectancy [6-9]. Addressing obesity and improving the health of children and adolescents are an urgent public health priority.

The treatment of simple childhood obesity typically involves lifestyle interventions such as diet and exercise, as well as Western medicine and surgery intervention [10-14] aimed at reducing energy intake, accelerating fat metabolism, and

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achieving short-term weight loss. However, these approaches have significant limitations, including side effects, patient selectivity, poor compliance, unstable long-term effects, and high surgical cost [15]. Additionally, weight loss methods such as starvation therapy, western medicine, and surgery have limited efficacy in children and adolescents due to their unique period of growth and development [16]. Traditional Chinese medicine (TCM) offers an alternative with proven clinical effectiveness and safety. Acupuncture and moxibustion, as natural and non-invasive therapies, may regulate metabolism and energy balance [17]. Studies suggest that acupuncture and moxibustion can help modulate organ function and contribute to weight control [18, 19]. However, the results may vary from person to person, and not all children may experience significant benefits. Discomfort during the acupuncture process also limits the consensus on its overall efficacy and safety.

Thus, we conducted a meta-analysis of the literature on acupuncture and moxibustion for treating simple obesity in children to evaluate its effectiveness.

Methods

Literature search and retrieval strategies

A systematic search was conducted in the Wanfang, CNKI, Chinese Biomedical Literature, VIP, Embase, PubMed, Cochrane Library, and Web of Science databases from December 2003 to October 2024. The search strategy incorporated a combination of MeSH terms and keywords: ("acupuncture" [Mesh]) OR (moxibustion [Title/Abstract]) OR (acupuncture and moxibustion [Title/Abstract]) AND (Children [Title/Abstract])) OR (juveniles [Title/Abstract]) AND ("obesity") OR (overweight [Title/Abstract]) AND (randomized controlled trial [Publication Type] OR randomized [Title/Abstract] OR placebo [Title/Abstract]). This meta-analysis has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) with the registration number: CRD42024613976.

Inclusion and exclusion criteria of literature

Inclusion criteria: (1) Research objects: Children and adolescents clearly diagnosed as obese or overweight, with no restrictions on gender or ethnicity; (2) Research type: Clinical controlled trials (e.g., randomized controlled trails, case-control studies, self-control trails); (3) Intervention measures of the experimental group: Clearly defined acupuncture treatment; (4) Intervention measures of the control group: Blank control, placebo treatment, non-specific treatment, Western medicine treatment, or internal treatment method of TCM, etc.; (5) Full text availability: Studies with accessible full texts, regardless of language or publication format.

Exclusion criteria: (1) Studies lacking clear diagnostic criteria or with ambiguous age boundaries (e.g., studies where the age range overlaps with those under 18 but has a small sample size or lacks age-stratified analysis); (2) Studies where the clinical intervention cannot be clearly identified as an RCT of acupuncture and moxibustion for treating simple obesity in children; (3) Studies without clearly defined clinical outcome indices; (4) Repeatedly detected or published studies; (5) Animal studies, reviews, or case reports.

Literature screening, data extraction and quality assessment

Literature was screened according to strict inclusion and exclusion criteria. Two pediatricians specializd in cardiovascular medicine independently reviewed the identified studies. They excluded studies that clearly did not meet the inclusion criteria and assessed the full text of potentially eligible studies to confirm their eligibility. Discrepancies were resolved by cross-checking and, when necessary, with the help of a third senior pediatrician.

The two evaluators extracted the required information using a predefined data extraction form, including: (1) Study details, such as title, first author, and year of publication; (2) Baseline characteristics, including sample size, gender distribution, mean age, follow-up duration; (3) Outcome measures. The methodological quality of the included studies was assessed using the Newcastle Ottawa Scale (NOS) criteria, as outlined by Juni et al. [20]. Studies were classified based on their total NOS scores. High quality: ≥7; moderate quality: 4-6; and low quality: ≤3.

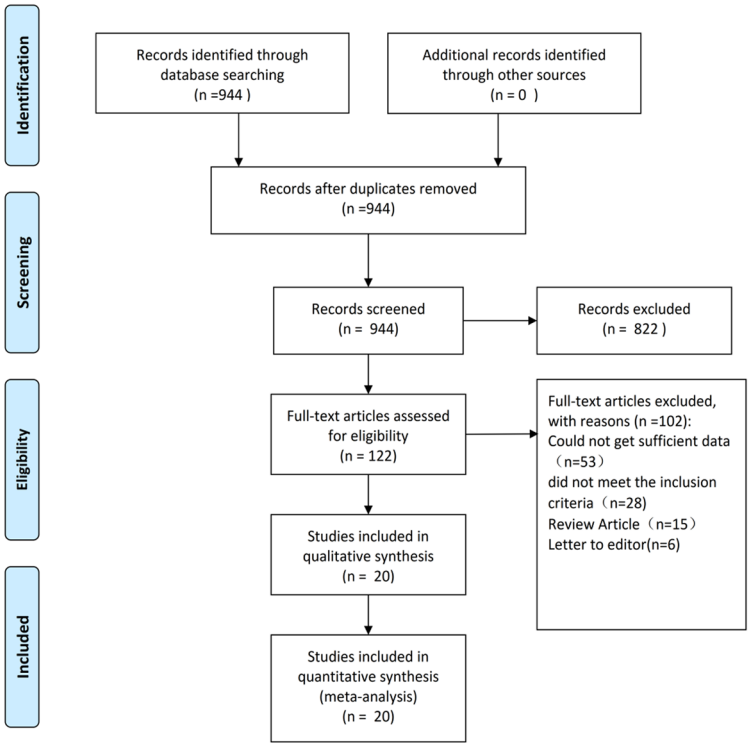

Figure 1. Flow diagram of literature search process.

Statistical analysis

Meta-analysis was conducted utilizing Review Manager (RevMan 5.3, Nordic Cochrane Center, Copenhagen, Denmark) and Stata 13.1 (StataCorp, College Station, Texas). Continuous outcomes were quantified using standardized mean differences (SMDs), while dichotomous outcomes were evaluated using risk ratios (RRs), both reported with 95% confidence intervals (CIs). Heterogeneity was assessed visually using forest plots and quantified by calculating I^2. An I^2 value greater than 50% was considered indicative of substantial heterogeneity. A fixed-effects model was applied when heterogeneity was minimal; otherwise, a random-effects model was utilized. Potential publication bias was qualitatively assessed using funnel plots in RevMan, particularly when the distribution of CIs showed significant divergence. The significance level (α) was set at 0.05 for all statistical tests.

Results

Study characteristics

Out of 944 studies initially identified, 122 potentially relevant studies were selected after excluding duplicates and irrelevant records. Further exclusions were made for review articles, case reports, letters, and studies that didn't meet the inclusion criteria. Finally, 20 studies [21-40] were included in the meta-analysis. The study selection process is depicted in **Figure 1**. The characteristics of the included studies are shown in **Table 1**. All studies were conducted in China. Randomization was implemented using either computer-generated random lists or randomly generated number patterns in most trials [21-40]. Overall, the quality of these studies was rated as moderate to high (**Figure 2**).

Blood lipids

Ten studies reported total cholesterol (TC) levels after intervention. Compared to the control group, acupuncture treatment significantly decreased TC levels (SMD = -0.53, 95% CI: -0.95 to -0.12, P<0.0001, I^2 = 87.3%). Ten studies reported triglyceride (TG) levels after intervention. Compared with control group, acupuncture treatment significantly decreased TG levels (SMD = -0.27, 95% CI: -0.54 to -0.01, P = 0.002, I^2 = 66.7%). Eight studies reported high-density lipoprotein (HDL) levels after intervention. Compared with control group, acupuncture treatment significantly increased HDL levels (SMD = 0.71, 95% CI: 0.16 to 1.26, P<0.0001, I^2 = 91.5%). Nine studies reported low-density lipoprotein (LDL) levels after intervention. Compared with control group, acupuncture treatment significantly decreased LDL levels (SMD = -1.04, 95% CI: -1.70 to -0.38, P<0.0001, I^2 = 93.7%). The details are shown in **Figure 3**.

Glycemic parameters

Four studies reported the fasting blood glucose levels after intervention. Compared with control group, fasting blood glucose level were significantly decreased after acupuncture treatment (SMD = -0.61, 95% CI: -1.08 to -0.13, I^2 = 82.2%; P = 0.0001) (**Figure 4**). Five studies

Table 1. Basic characteristics of the included study

Author/Year	Country	Sample size	Interventions		NOS score	Outcome index
			Experimental group	Control group		
Chen 2016 [21]	China	84/84	Acupuncture	Without treatment	5	Clinical curative effect and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), fasting plasma glucose (FPG), fasting insulin (FINS), serum apolipoprotein A5 (ApoA5), and leptin
Kong 2024 [22]	China	40/40	Acupuncture	Acupuncture combined with umbilical application	7	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), fasting plasma glucose (FPG), fasting insulin (FINS)
Li 2006 [23]	China	29/30	Ear acupoints combined with dietary regulation	Dietary regulation	8	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Li 2011 [24]	China	10/10	Acupuncture	Electroacupuncture	7	Intra-abdominal fat volume and total fat volume
Li 2020 [25]	China	27/29	Tuina combined with acupuncture	Dietary regulation	6	Clinical effect, body weight, body mass Index (BMI), waist circumference
Liu 2024 [26]	China	30/30	Press-needle treatment	Dietary regulation	7	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), fasting plasma glucose (FPG), fasting insulin (FINS)
Liu Qian 2024 [27]	China	41/41	Warming acupuncture and moxibustion combined with acupoint catgut embedding	Warming acupuncture and moxibustion	8	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Qiao 2009 [28]	China	30/30	Acupuncture	Meridian acupoint massage	6	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Song 2012 [29]	China	26/26	Acupuncture	Meridian acupoint massage	5	Clinical effect
Kong 2019 [30]	China	49/48	Acupuncture	Dietary regulation	8	Clinical effect
Wang 2016 [31]	China	26/26	Acupuncture	Dietary regulation	7	Clinical effect
Wang 2024 [32]	China	37/37	Warming acupuncture	Acupuncture	8	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Wei 2013 [33]	China	30/30	Acupuncture combined with auricular point sticking therapy	Meridian acupoint pressing combined with auricular point sticking therapy	7	Clinical effect
Xiao 2013 [34]	China	32/32	Acupuncture	Dietary regulation	5	Body mass index (BMI)
Xing 2009 [35]	China	88/51	Acupuncture	Dietary regulation	5	Detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), fasting plasma glucose (FPG), fasting insulin (FINS)
Xiong 2014 [36]	China	40/40	Acupuncture	Dietary regulation	7	Body mass index (BMI),detect the contents of total serum cholesterol (TC), plasma triglyceride (TG)
Yu 2022 [37]	China	30/30	Acupuncture	Dietary regulation	8	Body mass index (BMI)
Zhang 2017 [38]	China	17/15	Auricular acupuncture	Body acupuncture	8	Clinical curative effect, and detect the contents of total serum cholesterol (TC), plasma triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Zhang 2020 [39]	China	35/35	Auricular acupuncture	Dietary regulation	6	Detect the contents of total serum high-density lipoprotein (HDL), low-density lipoprotein (LDL)
Zhangmin 2020 [40]	China	50/50	Auricular acupuncture	Combination of acupuncture and traditional Chinese medicine	8	Detect the biochemical indicators, body mass index (BMI), and serum leptin level

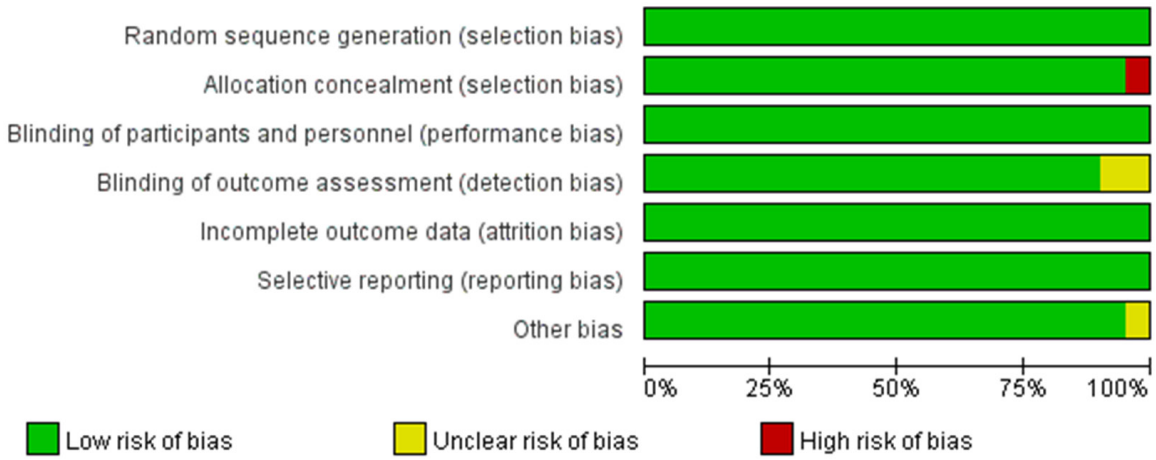

Figure 2. The assessment of risk of bias of included studies.

reported the fasting insulin levels after intervention. Compared with control group, fasting blood glucose level were decreased after acupuncture treatment (SMD = -0.70, 95% CI -0.88 to -0.51, I^2 = 42.3%), yet the difference was not statistically significant (P = 0.140) (**Figure 5**).

Weight-related indicators

(1) Body weight: Nine studies reported body weight measurements after intervention. Compared with control group, acupuncture treatment resulted in a significant reduction in body weight (SMD = -0.36, 95% CI: -0.65 to -0.07, I^2 = 64.7%) (P = 0.0004) (**Figure 6**).

(2) Height: Two studies reported height measurement after intervention. No significant change in height was observed with acupuncture treatment compared to the control group (SMD = -0.32, 95% CI: -0.79 to 0.16, I^2 = 41.6%) (P = 0.191) (**Figure 6**).

(3) Body mass index (BMI): Thirteen studies reported BMI measurements after intervention. Compared with control group, acupuncture treatment resulted in a significant decrease in BMI (SMD = -0.49, 95% CI: -0.80 to -0.18, I^2 = 81%) (P<0.0001) (**Figure 6**).

(4) Waist circumference: Seven studies reported waist circumference measurements after intervention. Compared with control group, acupuncture treatment significantly reduced waist circumference (SMD = -0.26, 95% CI: -0.55 to 0.04, I^2 = 54.4%) (P = 0.04) (**Figure 6**).

(5) Hip circumference: Four studies reported hip circumference measurements after intervention. No significant change in hip circumference was observed with acupuncture treatment compared to the control group (SMD = -0.25, 95% CI: -0.57 to 0.07, I^2 = 40.3%) (P = 0.170) (**Figure 6**).

(6) Waist-hip ratio: Two studies reported waist-hip ratio measurement after intervention. No significant change in waist-hip ratio was observed with acupuncture treatment compared to the control group (SMD = 0.29, 95% CI: -0.07 to 0.65, I^2 = 0%) (P = 0.385) (**Figure 6**).

Clinical effect

Twelve studies reported the clinical effect after intervention, and the results showed that no significant difference was observed in clinical efficacy between the acupuncture treatment group and the control group (SMD = 0.92; 95% CI: 0.84 to 1.00; I^2 = 0, P = 0.704) (**Figure 7**).

Leptin

Four studies reported leptin level after intervention. No significant difference in leptin level was observed between the acupuncture group and the control group (SMD: -0.89; 95% CI: -1.11 to 0.68; I^2 = 40.6, P = 0.168) (**Figure 8**).

Body fat related indicators

(1) Body fat percentage: Three studies reported body fat percentage measurements after inter-

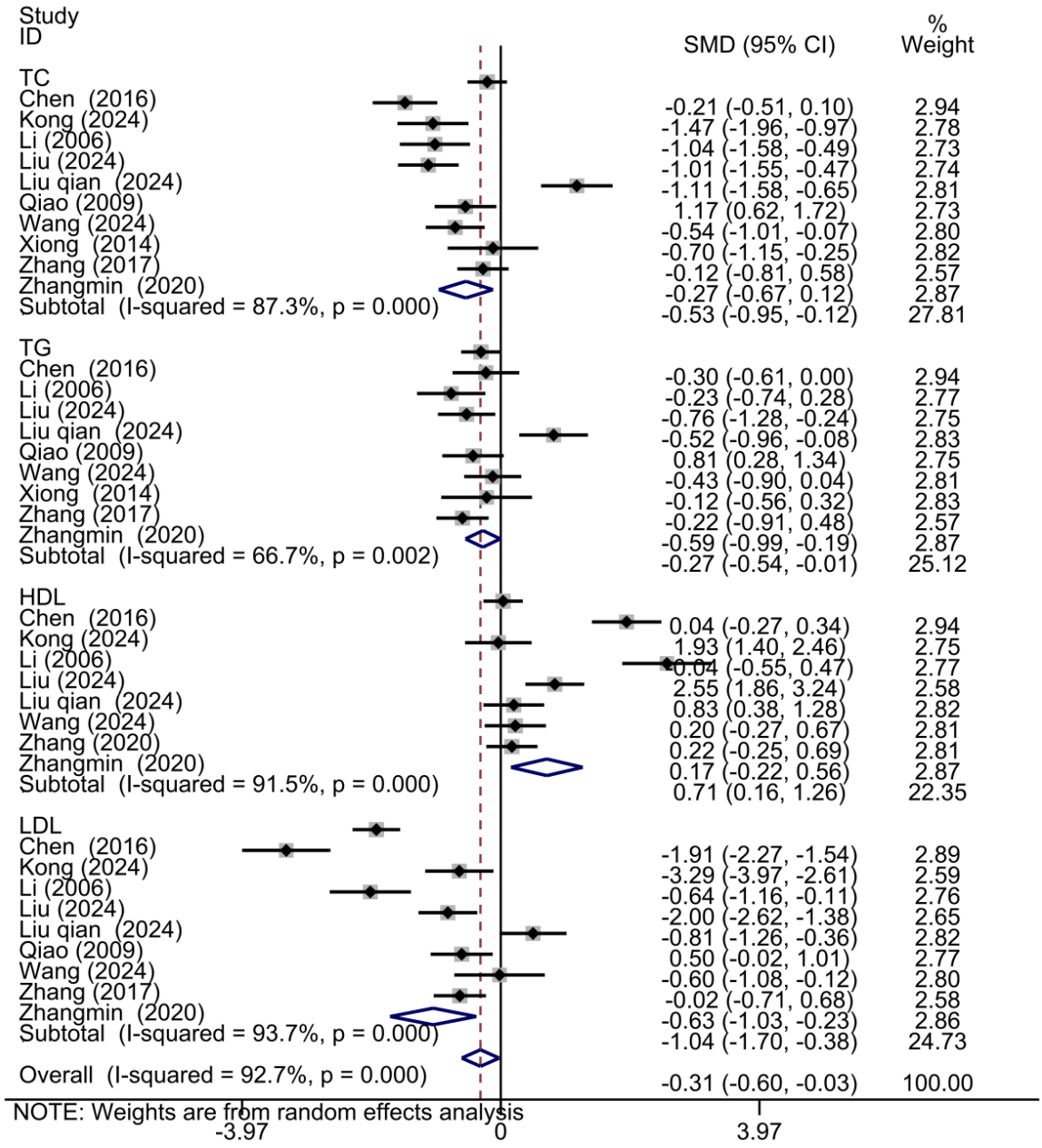

Figure 3. Forest plot of blood lipids.

vention. Compared to the control group, acupuncture treatment did not result in a significant reduction in body fat percentage (SMD = -0.50, 95% CI: -0.77 to -0.22, I^2 = 0%; P = 0.436) (**Figure 9**).

(2) Intra-abdominal fat volume: Two studies reported intra-abdominal fat volume after intervention. Compared with control group, acupuncture treatment did not result in a significant reduction in fat volume (SMD = -0.72, 95% CI: -1.16 to -0.28, I^2 = 0%; P = 0.878) (**Figure 9**).

TCM syndrome score

Six studies reported the TCM syndrome scores after intervention. The results showed that the acupuncture treatment resulted in a significant decrease in TCM syndrome scores

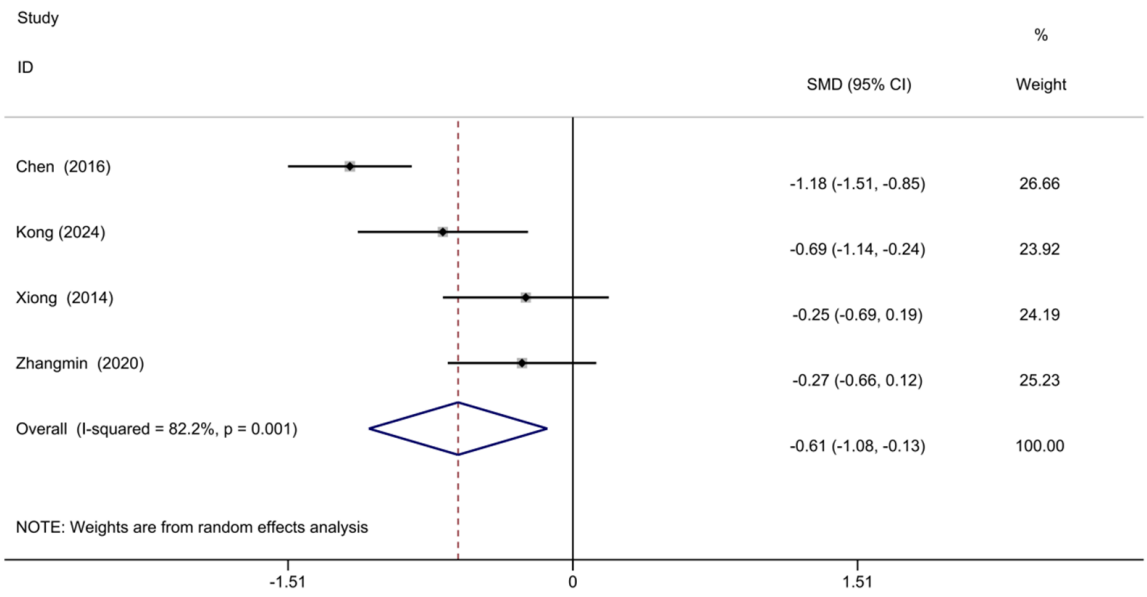

Figure 4. Forest plot of fasting blood glucose.

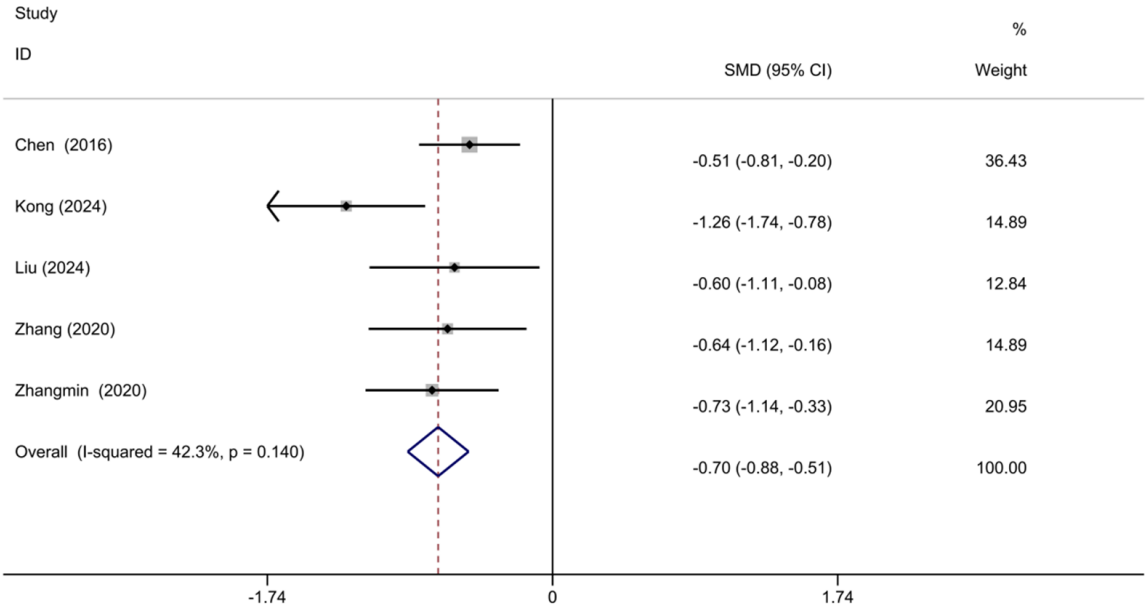

Figure 5. Forest plot of fasting insulin.

compared to control therapy (SMD = -1.49; 95% CI: -2.73 to 0.25, I^2 = 96.4%; P<0.0001) (**Figure 10**).

Publication bias

Funnel plots for each meta-analysis are shown in **Figure 11**. The symmetry observed in these plots, with most studies aligning near the central axis, indicates relatively low levels of publication bias.

Sensitivity analysis

A sensitivity analysis was conducted to assess the robustness of the results by evaluating the impact of excluding individual studies one at a time. The results showed that removing any

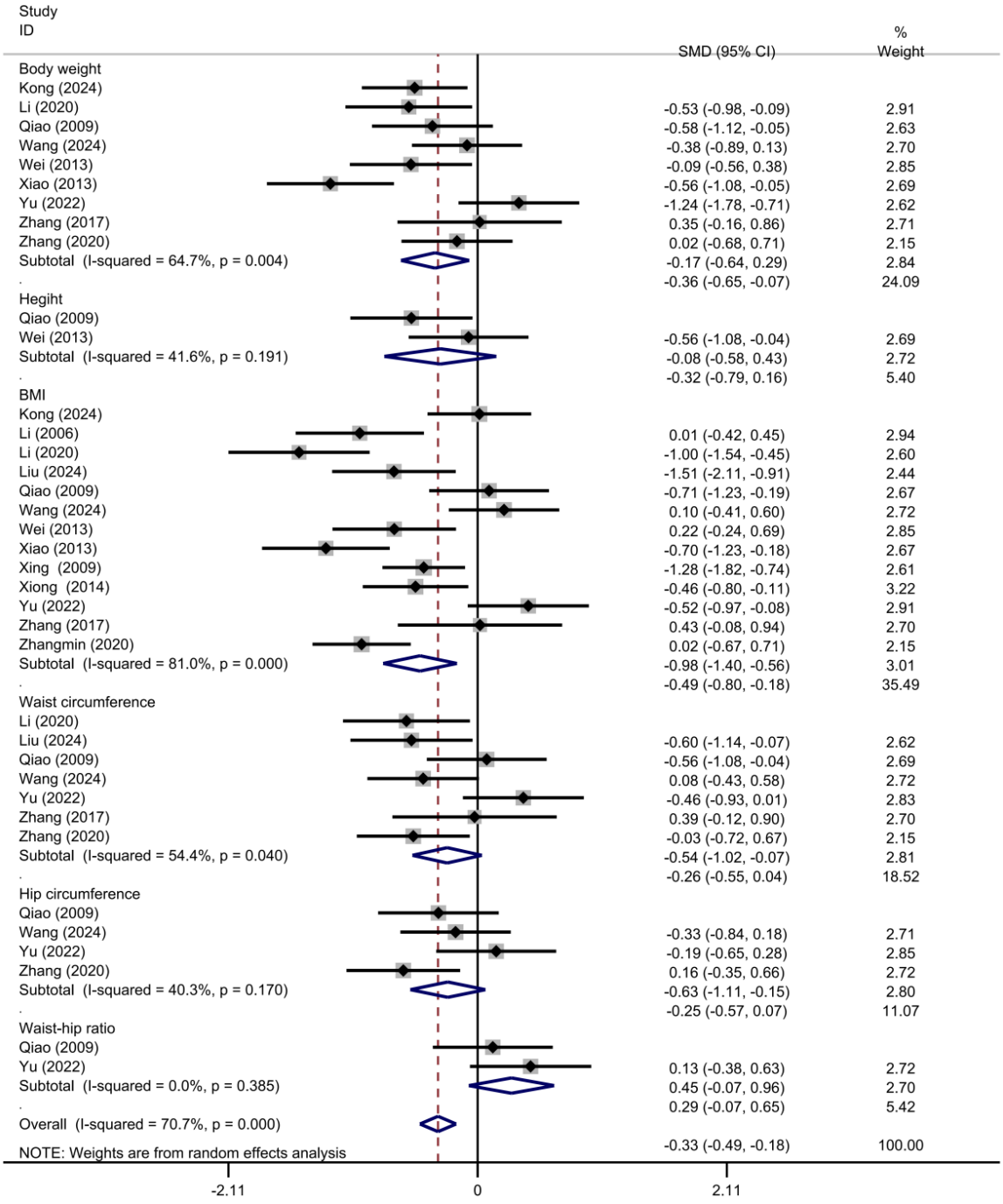

Figure 6. Forest plot of weight-related indicators.

single study did not significantly alter the pooled effect estimates for the primary outcomes, such as glycemic efficacy (pooled effect size range: 1.05 to 1.23). This indicates low sensitivity and high stability of the meta-analysis, confirming that the results were not overly influenced by any single study or assumption.

Discussion

This study conducted a meta-analysis to evaluate the efficacy of acupuncture and moxibustion therapy in treating simple obesity in children. Multiple key outcome indicators were analyzed to provide a comprehensive under-

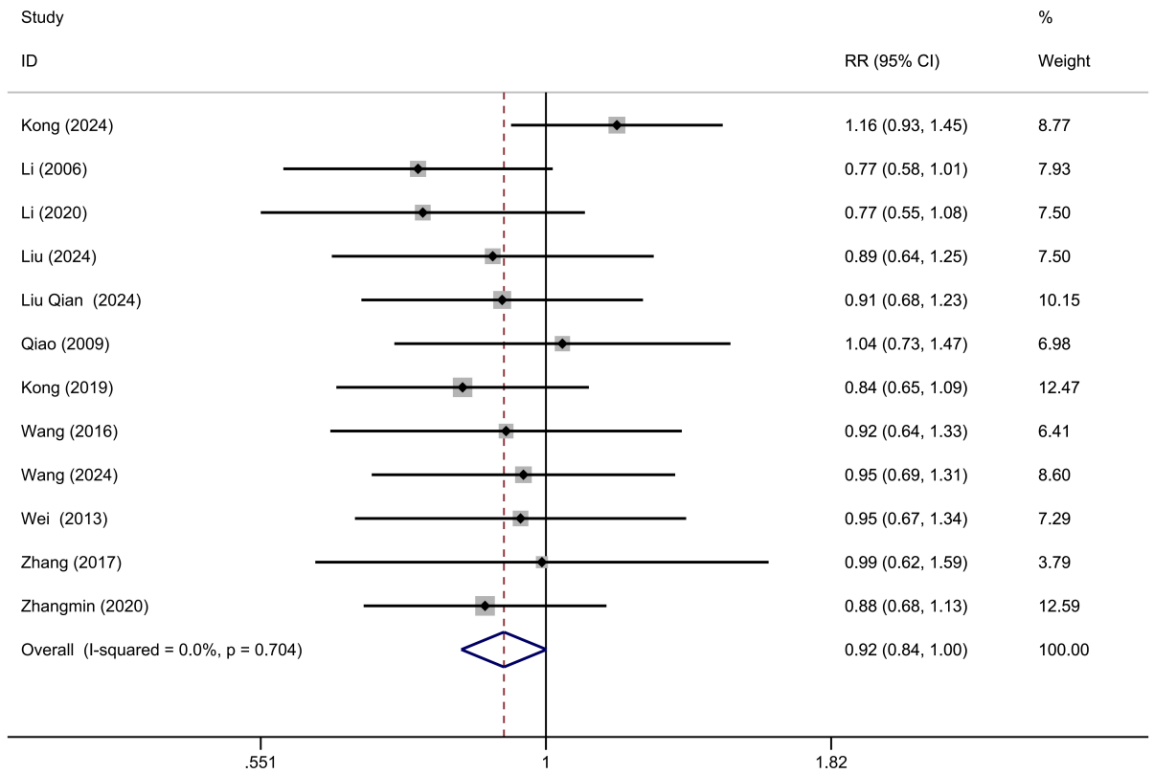

Figure 7. Forest plot of clinical effect.

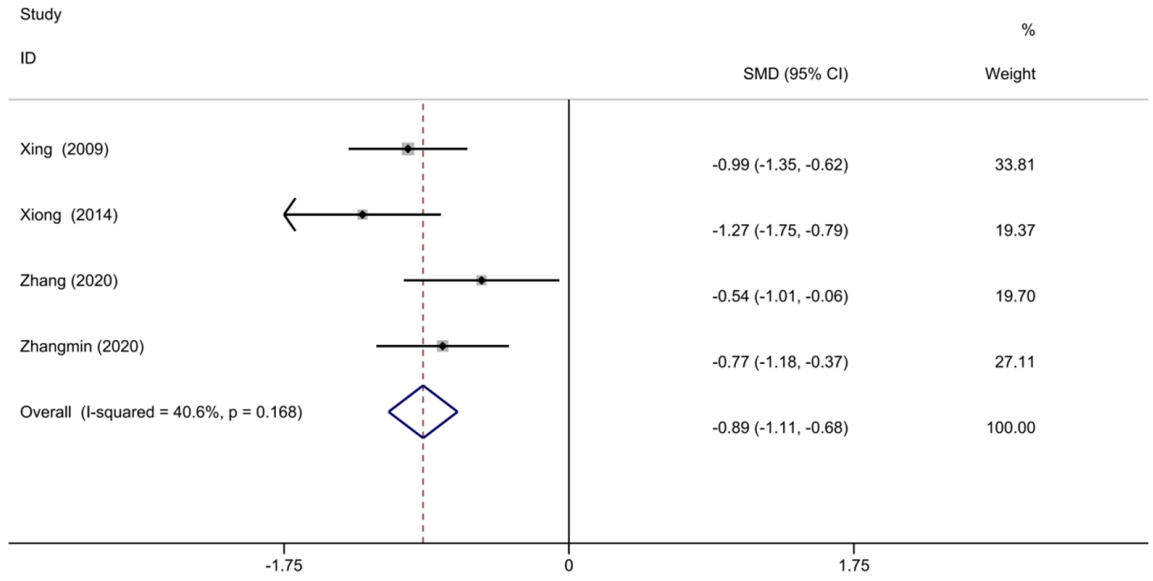

Figure 8. Forest plot of leptin.

standing of the therapeutic effects. Metabolic markers such as blood lipids, fasting blood glucose, and fasting insulin were assessed to reflect improvements in metabolic function. Weight-related indicators, including BMI, body weight, and waist circumference, were assessed to measure physical changes. Additionally, body fat-related parameters and leptin levels were analyzed to observe reductions in adiposity and appetite regulation. Clinical effec-

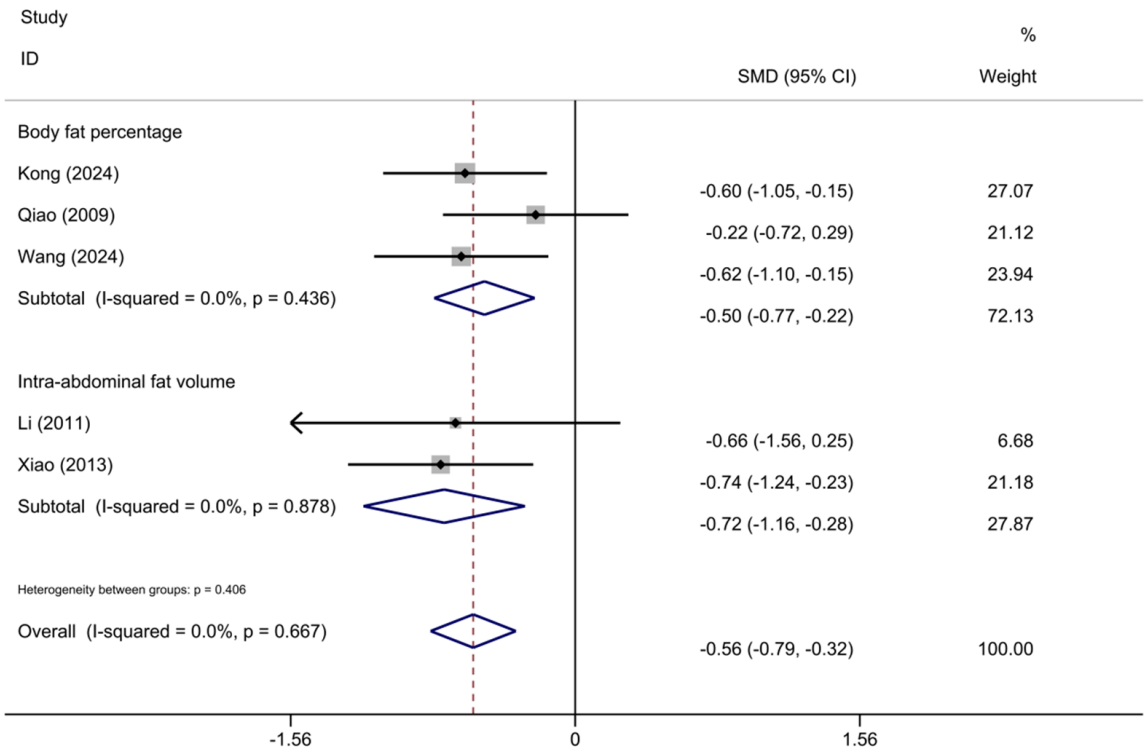

Figure 9. Forest plot of body fat-related indicators.

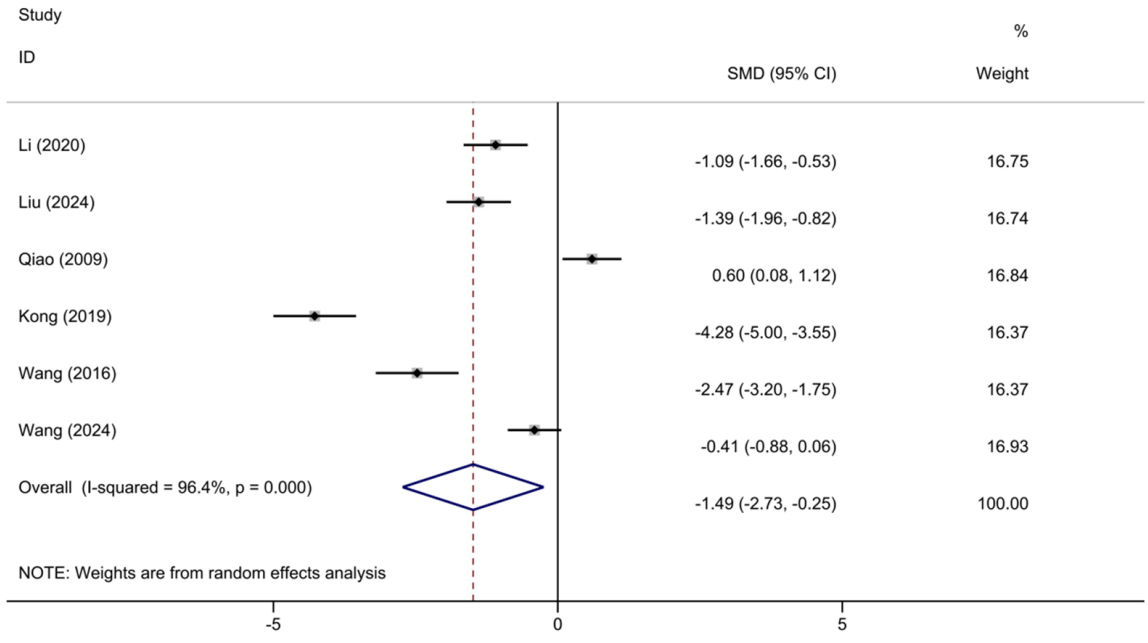

Figure 10. Forest plot of TCM syndrome scores.

tiveness was also evaluated through improvements in TCM syndrome scores, which reflect holistic health benefits from the perspective of TCM. The findings suggest that acupuncture and moxibustion therapy significantly improve both metabolic and physical health indicators,

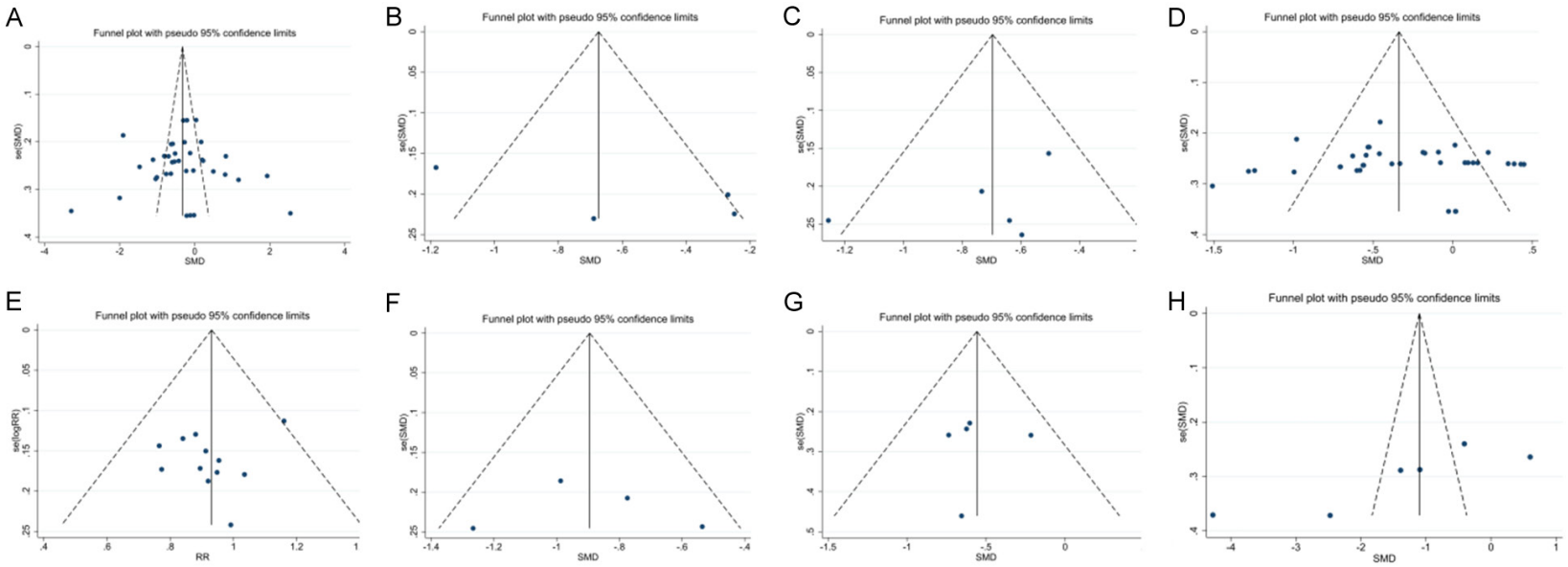

Figure 11. Publication bias analyzed using funnel plot. A. Publication bias for studies reporting blood lipids; B. Publication bias for studies reporting fasting blood glucose; C. Publication bias for studies reporting fasting insulin; D. Publication bias for studies reporting weight-related indicators; E. Publication bias for studies reporting clinical effect; F. Publication bias for studies reporting leptin; G. Publication bias for studies reporting body fat-related indicators; H. Publication bias for studies reporting TCM syndrome scores. TCM: Traditional Chinese Medicine.

as well as holistic clinical outcomes, highlighting their potential as an effective treatment for simple obesity in children.

Acupuncture has been shown to improve blood lipid levels in children with simple obesity, consistent with current studies [41, 42]. Its mechanism of action likely involves multiple pathways. First, acupuncture can regulate the body's neuroendocrine system by stimulating specific acupoints, which influences the secretion and function of hormones involved in lipid metabolism. For example, it can modulate insulin secretion and other hormones, thereby improving lipid metabolism [43]. Additionally, acupuncture has been found to enhance sympathetic nervous system activity, which increases energy expenditure and fat oxidation, promoting the breakdown and utilization of lipids, contributing to improved lipid profiles [44]. Furthermore, acupuncture exerts a comprehensive regulatory effect on the body's internal environment and physiological functions, aiding in the restoration of normal lipid metabolism. This holistic regulation not only improves blood lipid levels but also contributes to overall health in children with simple obesity [45]. Therefore, acupuncture can effectively improve blood lipid metabolism in children with simple obesity through neuroendocrine regulation, enhanced fat oxidation, and comprehensive physiological modulation, highlighting its potential as a beneficial therapeutic approach for managing obesity-related metabolic disorders.

Our study found that acupuncture can effectively reduce fasting blood glucose levels in children with simple obesity. This effect is achieved through several potential mechanisms. First, acupuncture regulates the neuroendocrine system by stimulating specific acupoints, which influences the secretion and function of key hormones involved in glucose metabolism, such as insulin and glucagon. This regulation helps restore the balance of glucose metabolism [46]. Second, acupuncture has been shown to improve insulin sensitivity, allowing cells to respond more effectively to insulin. This enhancement promotes better glucose uptake and utilization, ultimately contributing to lower blood glucose levels [47]. Additionally, acupuncture can modulate the autonomic nervous system by balancing sympathetic and parasympathetic activity, further supporting glucose metabolism [48]. Moreover, acupuncture may have indirect effects, such as improving lipid metabolism and reducing inflammation, both of which are closely linked to glucose metabolism disorders. Thus, acupuncture reduces fasting blood glucose levels in children with simple obesity through a combination of neuroendocrine regulation, enhanced insulin sensitivity, autonomic nervous system modulation, and broader effects on lipid metabolism and inflammation. This makes it a promising therapeutic approach for managing glucose metabolism disorders in obesity.

Our study revealed that acupuncture can effectively reduce weight, BMI, and waist circumference in children with simple obesity. Several mechanisms may explain this effect. First, acupuncture regulates the neuroendocrine system by stimulating specific acupoints, which influence the secretion and balance of key neurotransmitters and hormones involved in metabolism, such as leptin and ghrelin. These hormones play critical roles in appetite control and energy balance. By adjusting their levels, acupuncture helps reduce food intake and increase energy expenditure, thereby promoting weight loss [49, 50]. Second, acupuncture impacts energy metabolism by enhancing the activity of certain metabolic pathways and improving energy utilization efficiency. This promotes the breakdown and utilization of fat, leading to a reduction in body fat accumulation, weight, and BMI [51, 52]. Lastly, acupuncture may directly affect abdominal adipose tissue. By stimulating specific acupoints, it promotes blood circulation and lymphatic drainage in the abdominal region, reducing adipose tissue accumulation around the waist and resulting in a smaller waist circumference [53]. Hence, acupuncture facilitates weight loss and improvements in BMI and waist circumference in children with simple obesity through its regulation of appetite hormones, enhancement of energy metabolism, and localized effects on abdominal adipose tissue, making it an effective and comprehensive approach for obesity management.

Our study demonstrated that acupuncture can significantly reduce the integral of TCM syndromes in children with simple obesity. This improvement can be attributed to acupuncture's multifaceted regulatory effects on the body. First, acupuncture regulates energy metabolism by stimulating specific acupoints, which influence the hypothalamus-pituitary-

adrenal (HPA) axis and related neurotransmitter systems. This adjustment promotes an increased metabolic rate, facilitating the consumption of excess fat [54]. Second, acupuncture affects the digestive system by regulating the secretion and function of gastrointestinal hormones. This enhances digestion and absorption processes, helping control appetite and food intake, and contributing to a more balanced energy intake [55]. Third, acupuncture affects both the endocrine and immune systems. By modulating the secretion of hormones such as leptin and adiponectin, acupuncture improves lipid metabolism and alleviates symptoms associated with obesity. Additionally, it may improve immune function and strengthen the body's overall regulatory capacity, supporting a holistic improvement in health [55]. Through its regulation of energy metabolism, digestive system function, endocrine balance, and immune system, acupuncture reduces the TCM syndrome scores in children with simple obesity. These comprehensive effects underscore acupuncture's potential as an effective therapy for improving both metabolic health and overall well-being in children with obesity.

However, this study had some limitations. First, different acupuncture techniques, treatment regimens, and patient characteristics among the studies may lead to inconsistent findings. Second, there might be potential biases in the selection of studies, such as publication bias, which could skew the overall conclusion. Additionally, the long-term effects of acupuncture treatment are often difficult to accurately assess due to the limited follow-up periods in many studies. Moreover, it is challenging to fully eliminate the influence of other confounding factors that may interact with acupuncture and affect the outcome. Finally, the understanding and interpretation of the mechanisms underlying acupuncture's effect on childhood obesity may still be incomplete, leaving some uncertainties regarding its exact mode of action.

This systematic review focused on the effect of acupuncture and moxibustion in children with simple obesity in randomized clinical trials. There is now convincing evidence suggesting that acupuncture and moxibustion can lead to improvements in fasting blood glucose, waist circumference, TCM syndrome score, weight, and BMI, and lipid levels in these cohorts.

Disclosure of conflict of interest

None.

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