DOI: 10.53469/jcmp.2026.08(03).49

Meta-Analysis of Heat-Clearing and Dampness-Resolving Chinese Herbal Medicines in Treating Atopic Dermatitis Animal Models

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Abstract: ***Objective:*** ***This study employed meta-analysis to systematically evaluate the therapeutic efficacy of heat-clearing and dampness-resolving Chinese herbal medicines interventions in animal models (rats or mice) of atopic dermatitis (AD), thereby providing evidence-based support for the clinical treatment of damp-heat pattern AD.*** ***Methods:*** ***A computerized search was conducted in PubMed, Embase, Web of Science, The Cochrane Library, CNKI, CBM, Wanfang Data, and VIP databases to collect randomized controlled trial data on Chinese herbal medicines with heat-clearing and dampness-resolving properties for treating rat or mouse models of atopic dermatitis. The search period spanned from the inception of each database to June 19,2025. The intervention group received heat-clearing and dampness-resolving Chinese herbal medicines treatment without formulation restrictions, while the control group received conventional Western medication alone. The SYRCLE tool was used to assess the risk of bias in included studies. Quality assessment was conducted in accordance with the Cochrane Handbook for Systematic Reviews. Statistical analysis was performed using Review Manager 5.4 and Stata 18.0 software.*** ***Results:*** ***A total of 16 randomized controlled trials were ultimately included, covering BALB/c mice, KM mice, Flaky tail mice, Nc/Nga mice, and C57BL/6 mice. Meta-analysis results indicate that heat-clearing and dampness-resolving Chinese herbal medicines can reduce skin lesion scores in atopic dermatitis mice (SMD = 0.11, 95% CI = -0.73–0.94, P = 0.80), decrease scratching frequency (SMD = 0.33, 95% CI = -0.55–1.21, P = 0.47), decrease the number of mast cells in skin lesions (SMD = 0.68, 95% CI = -0.19–1.55, P = 0.12), and downregulate serum IgE (SMD = -0.13, 95% CI = -0.55–0.29, P = 0.54) and IL-4 (SMD = 0.09, 95% CI = -1.17–1.35, P = 0.89). None of these differences were statistically significant, indicating that the treatment effects were comparable between the experimental and control groups. The spleen coefficient (SMD = 4.53, 95% CI = 2.77–6.29, P<0.00001) and epidermal thickness at the lesion site (SMD = 1.84, 95% CI = 0.82–2.85, P = 0.0004) in control mice were significantly lower than those in the experimental group. Serum IL-10 levels (SMD = -1.40, 95% CI = -2.45–-0.34, P = 0.009) were significantly higher in control mice compared to experimental mice, with statistically significant differences.*** ***Conclusion:*** ***Chinese herbal medicines with heat-clearing and dampness-resolving properties can improve skin lesions in AD mice, downregulate serum IgE and IL-4 levels, reduce the number of mast cells in lesions, alleviate skin itching, and thereby relieve AD symptoms. Given the overall low quality and high heterogeneity of the included studies, further high-quality clinical trials or animal studies are still needed in the future.***

Keywords: Atopic dermatitis, Heat-clearing and dampness-resolving, Meta-analysis, Animal model, Systematic evaluation.

1. Introduction

Atopic dermatitis (AD) is the most common chronic inflammatory skin disease, carrying a significant socioeconomic impact, particularly among patients with moderate to severe disease [1]. Its clinical features include eczematous skin lesions, dry skin, and varying degrees of itching [2]. AD affects over 200 million people worldwide. Global epidemiological studies indicate that the prevalence of AD in children ranges from 15% to 20%, while the prevalence in adults can reach up to 10% [3-4]. Although the underlying pathogenesis remains incompletely understood, the academic community believes it results from the combined effects of epidermal barrier dysfunction and immune dysregulation [5]. Currently, western medicine primarily treats AD with glucocorticoids, calcineurin inhibitors, and oral antihistamines [6]. Some patients with moderate-to-severe atopic dermatitis receive immunotherapy such as dupilumab in combination with other treatments [7]. While this approach demonstrates certain short-term therapeutic efficacy and can help regulate immune imbalance, it is accompanied by numerous side effects and a high recurrence rate after discontinuation. In contrast, in recent years, traditional Chinese medicine has demonstrated significant advantages in treating atopic dermatitis, effectively alleviating clinical symptoms, reducing the incidence of side effects, preventing recurrence, and improving patients' quality of life.

In ancient Chinese medical texts, atopic dermatitis does not have a specific corresponding disease name. However, based on its clinical characteristics, it can be classified under conditions such as "Siwanfeng", "Naixian" and "Taichuang". Modern Chinese medicine researchers, when exploring the etiology and pathogenesis of atopic dermatitis, modern TCM scholars attribute it to congenital constitutional deficiency, spleen deficiency leading to the internal generation of damp-heat, and external invasion by wind-damp-heat pathogens. They believe that the primary pathological factor in this condition is wind-damp-heat, which is closely linked to the Five Zang-Organs [8]. Mr. Zhao Bingnan, a renowned modern expert in traditional Chinese dermatology, believed the essence of this disease lies in the interaction between internal damp-heat and external pathogenic damp-heat. The damp pathogen is a constant factor and, over time, transforms into heat. These two conditions feed into each other, resulting in a protracted and difficult-to-cure condition [9]. Damp-heat syndrome is a common clinical pattern in atopic dermatitis (AD). Following the principles of evidence-based medicine, this study employs meta-analysis to systematically evaluate the clinical efficacy of traditional Chinese medicines that heat-clear and resolve dampness in treating atopic dermatitis. It also explores their potential mechanisms of action to

provide evidence-based support for the clinical management of AD.

2. Materials and Methods

2.1 Inclusion Criteria

(1) Study Type: Randomized controlled trials, with literature restricted to Chinese and English. (2) Study Subjects: This study selected mice or rats as subjects, without consideration of gender or strain. Animals were modeled as atopic dermatitis models, with no restrictions on the methods used to establish the animal models. (3) Intervention Measures: The experimental group received traditional Chinese medicine treatment without restrictions on dosage form. The control group received conventional Western medicine treatment alone. Specifications for the experimental group's intervention measures: The primary functions of the herbal medicines or formulas used in the study included clearing heat and eliminating dampness, clearing heat and promoting diuresis, clearing heat and removing dampness, clearing heat and drying dampness, clearing heat and resolving dampness, and clearing and draining damp-heat. (4) Outcome Measures: Skin lesion score, scratching frequency, splenic coefficient, epidermal thickness, mast cell count, serum IgE, IL-4, IL-10.

2.2 Exclusion Criteria

(1) Non-randomized controlled studies; (2) Studies where traditional Chinese medicine treatment methods did not meet requirements, the control group received non-Western medicine treatment, or interventions involved other therapies such as acupuncture, cupping, autohemotherapy at acupoints, or acupoint catgut embedding; (3) Literature where full text was unavailable, data contained errors, data were incomplete, or data could not be extracted; (4) Studies using non-AD animal models; (5) Reviews, meta-analyses, case reports, and conference abstracts; (6) Studies with non-compliant research designs, duplicate publications, similar data, or non-compliant outcome measures.

2.3 Literature Search

Computer-assisted searches were conducted in databases including PubMed, Embase, Web of Science, The Cochrane Library, CNKI, CBM, Wanfang, and VIP, covering the period from each database's inception to June 19, 2025. Chinese search terms include teyingxingpiyan, teyingxingshizhen, yiweixingpiyan, yiweixingshizhen, zhongyao, zhongyi, zhongcaoyao, zhongyiyao, xiaoshu, dashu; English search terms include atopic dermatitis 、 atopic eczema, atopic neurodermatitis, disseminated neurodermatitis, infantile eczema, eczema endogenous, coca sulzberger disease, Chinese medicine, Chinese herbal drugs, Chinese plant extracts, rats, rattus. All use a search method that combines subject headings and free-text search terms.

2.4 Literature Screening and Data Extraction

Two independent researchers rigorously screened, extracted, and cross-checked data throughout the study cycle in strict accordance with inclusion and exclusion criteria. In cases of disagreement, a third party intervened to resolve the matter. The specific data extraction process is as follows: All retrieved literature was imported into EndNote 21 software, where duplicates and studies failing to meet inclusion criteria were excluded. The following information was then systematically extracted:(1) Basic information: Title, author, and publication date; (2) Study subjects: Animal species, body weight, model construction method, and sample size; (3) Intervention measures: Drug name, herbal medicine components, dosage, and treatment duration; (4) Outcome measures; (5) Information related to risk of bias assessment.

2.5 Quality Evaluation Criteria

This study employed the SYRCLE [10] animal experiment bias risk assessment tool to evaluate the quality of the included literature. The tool comprises 10 items across six domains: selection bias, performance bias, measurement bias, attrition bias, reporting bias, and other biases. For each item, the final assessment outcome was categorized as "Yes" for low risk of bias, "No" for high risk of bias, and "Uncertain" for uncertain risk of bias.

2.6 Statistical Analysis

Statistical analyses in this study were performed using Review Manager 5.4 and Stata 18.0. The assessment of heterogeneity in the literature followed the Cochrane Handbook. To account for differences in experimental methods, animal species, and study settings, the standardized mean difference (SMD) was used as the effect measure, and its 95% confidence interval (CI) was calculated. When $I^2 \leq 50\%$ and $p > 0.1$, heterogeneity among studies was considered low, and a fixed-effects model was used; When $I^2 > 50\%$ and $p \leq 0.1$, the sources of heterogeneity were investigated through sensitivity analysis and subgroup analysis; for results that still exhibited high heterogeneity, a random-effects model was adopted. Stata 18.0 software was used to perform Egger's test and construct funnel plots to assess whether publication bias was present in the included studies.

3. Results

3.1 Literature Search

Based on the search strategy, a total of 708 relevant publications were identified. Using EndNote 21 software, 275 duplicate publications were excluded. After reviewing titles and abstracts, 381 publications were excluded, including reviews, meta-analyses, conference proceedings, and studies not meeting the theme criteria, leaving 52 publications for preliminary inclusion. During the full-text review phase, 36 additional studies were excluded for the following reasons: inability to extract complete data, Chinese herbal medicine treatment methods not meeting requirements, control groups receiving non-Western pharmaceutical treatments, outcome measures not meeting criteria, inadequate study design, non-randomized controlled trials, duplicate publications, or similar data. Ultimately, 16 studies were included in the analysis [9,11-25], comprising 4 English-language [15,20,24-25] and 12 Chinese-language publications [9,11-14,16-19,21-23]. The literature screening process is illustrated in Figure 1.

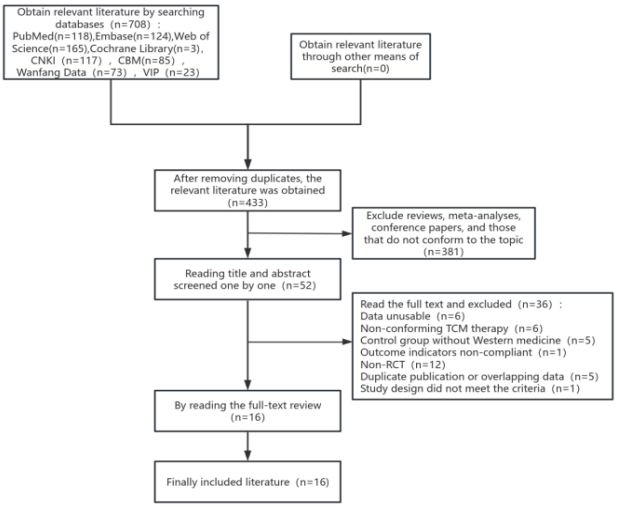

Figure 1: Literature Screening Process

3.2 Basic Characteristics for Inclusion in the Literature

This study included 16 published articles, analyzing a total of 902 animals. Eleven studies used BALB/c mice [11,13,15-21,24-25] one study used KM mice [12], one study used Flaky tail mice [14], one study used Nc/Nga mice [9], and two studies used C57BL/6 mice [22-23]. Regarding model construction methods, eight studies employed topical application of DNCB to the skin [9,11,15,17-19,21,24], six studies used topical application of DNFB to the skin [13,16,20,22-23,25], one study utilized topical application of calcipotriol ethanol solution to the skin [12], and one study employed a spontaneous AD mouse model [14]. Interventions included topical application and oral administration, with treatment cycles ranging from 7 to 21 days. The basic characteristics of the included studies and the composition of the formulas are presented in Table 1.

Table 1: Basic Information of Included Literature

Studies	Animals	Weight (g)	Modeling method	Sample size	Interventions		Course of treatment	Outcome indicators
					Experimental group	Control group		
SUN Yun 2021	BALB/c mice	18-22	DNCB	8/8	oxymatrine(L 0.025g/kg,M 0.05g/kg,H 0.1g/kg)	DXM	14	③⑥⑦
Yang Liuyun 2024	KM mice	18-22	MC903	10/10	Zhuang medicine Shiduxiao decoction (2.7g/mL/10g)	PAT	7	①⑥⑦
Li Chun 2020	BALB/c mice	18-22	DNFB	6/6	Ta-Xi-San(L 0.65g/mL, H 1.3g/mL)	HyB	21	①③⑥⑦
Wang Dongming 2019	Flaky tail mice	NR	Spontaneous dermatitis	10/10	Qingre-Qushi recipe(L 1.93g/kg/d, M 3.86 g/kg/d, H 7.72 g/kg/d)	Ceti	14	①②
Meng Yujiao 2021	Nc/Nga mice	22-26	DNCB	8/8	Qingre Chushii decoction(L 0.025g/kg/d, M 0.05g/kg/d, H 0.1g/kg/d)	Pred	14	②③④⑤⑥⑦
Xia Ting 2022	BALB/c mice	18-22	DNCB	8/8	Ermiao Wan(1.8g/kg)	DEXA	14	①
Li Caiyan 2021	BALB/c mice	18-22	DNFB	12/12	Mahuang Lianqiao Chixiaodou Decoction(11.86g/kg)	Piyanping	7	②
Zhang Huili 2024	BALB/c mice	18-22	DNCB	6/6	Liangxue Qushi Zhiyang Decoction(L 3.8g/mL, H 7.6g/mL)	Pred	14	①②⑤
Deng Yutong 2022	BALB/c mice	NR	DNCB	8/8	Qingshi Zhiyang ointment(L 0.09g, M 0.18g, H 0.36g)	HCB	7	①
He Qiuting 2024	BALB/c mice	25-28	DNCB	6/6	Huangliansan oil(L 0.3g/kg, M 0.6g/kg, H 1.20g/kg)；water extract of Huangliansan (0.6g/kg)	HC	14	①②③
Liu Jingang 2021	BALB/c mice	18-22	DNFB	10/10	Mahuang Lianqiao Chixiaodou decoction(11.86g/kg)	PC	7	①
Liu Xinyue 2024	BALB/c mice	18-22	DNCB	12/12	Phellodendri Chinensis Cortex-Cnidii Fructus herb pair(L 1.43mg/g, M 2.86mg/g, H 5.72mg/g)	Pred	20	①②④⑥⑦
Yang Niuniu 2023	C57BL/6 mice	NR	DNFB	8/8	obacunone, dictamnine, fraxinellone (10mg/kg)	DXM	14	①④⑤②⑦⑧
Deng Jialin 2024	C57BL/6 mice	NR	DNFB	8/8	obacunone, dictamnine, fraxinellone (10mg/kg)	DXM	14	①②④⑤⑦⑧
Sun Zhanxue 2018	BALB/c mice	19-25	DNCB	65/65	Liang Xue Qu Shi Zhi Yang soup (0.5g/mL)	EBS	14	①⑦
Yuan Huimin 2022	BALB/c mice	18-22	DNFB	6/6	Mahuang Lianqiao Chixiaodou decoction 11.98g/(kg·d)	Mometasone furoate	7	⑥⑦⑧

Note: ① Skin lesion score; ② Scratching frequency; ③ Splenic coefficient; ④ Epidermal thickness; ⑤ Mast cell count; ⑥ Serum IgE; ⑦ IL-4; ⑧ IL-10.

3.3 Bias Risk Assessment

Among the 16 included studies, the majority of risk of bias assessments were rated as "uncertain," indicating that most studies had insufficient information, potentially leading to unknown risks of bias. Regarding selection bias (items 1–3), 16 studies mentioned random assignment, but only 5 employed random number tables [12,18-20,25]. All studies reported baseline data but did not mention allocation concealment. Regarding performance bias (items 4-5), none of the studies explicitly reported this. For measurement bias (items 6-7), none of the studies described the random selection process of experimental animals in outcome assessment or whether outcome assessors were blinded. Regarding attrition bias (item 8), one study did not adequately describe and explain data missingness [11]. One study reported that two mice died at the end of the modeling. Additionally, during treatment, one model mouse in both the treatment and control groups died from asphyxiation due to accidental aspiration of the drug into the trachea. Ultimately, this did not affect the validity of the results [24]. Regarding reporting bias (item 9), all studies were rated as having a low risk of bias. Furthermore, the presence of other potential biases remains unclear (item 10). Specific results are shown in

Figures 2 and 3.

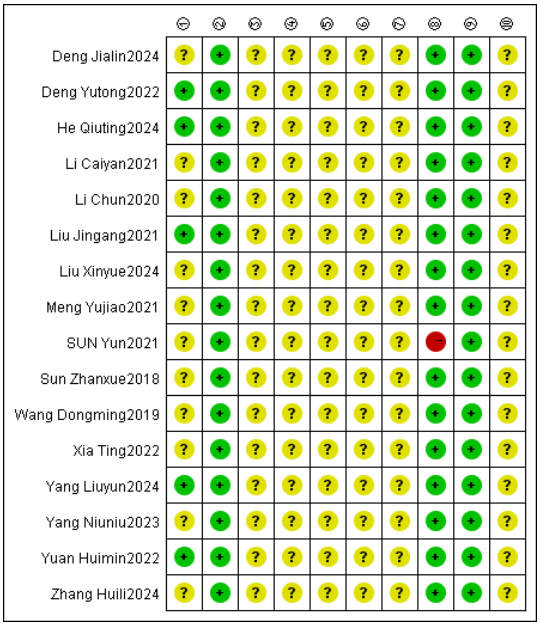

Figure 2: Summary of Bias Risks

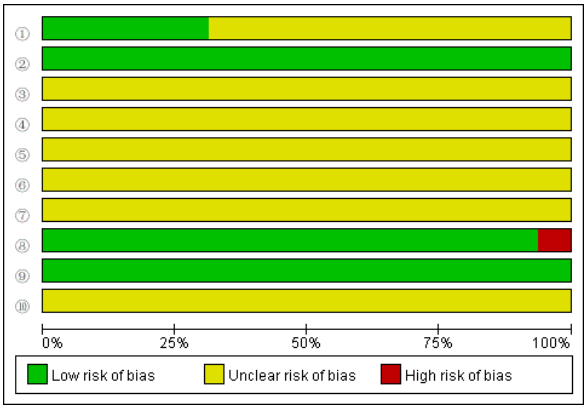

Figure 3 Bias Risk Analysis

Note: ① Whether the allocation sequence was adequately generated or applied; ② Whether the baseline characteristics were comparable across groups; ③ Whether allocation concealment was adequate; ④ Whether animals were randomly housed during the study; ⑤ Whether researchers were blinded; ⑥ Whether animals for outcome assessment were randomly selected; ⑦ Whether outcome assessors were blinded; ⑧ Whether incomplete data were reported; ⑨ Whether selective reporting was absent in the study report; ⑩ Whether other biases were present.

3.4 Meta-analysis Results

3.4.1 Skin Lesion Score

In 12 studies [12-15,17-24], the skin lesion scores were evaluated. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 93\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. The random effects model was used for analysis. The results of the meta-analysis showed that the lesion scores of the mice in the experimental group were comparable to those of the control group, and there was no statistically significant difference between the two groups (SMD = 0.11, 95% CI = -0.73–0.94, Z = 0.25, P = 0.80), as shown in Figure 4.

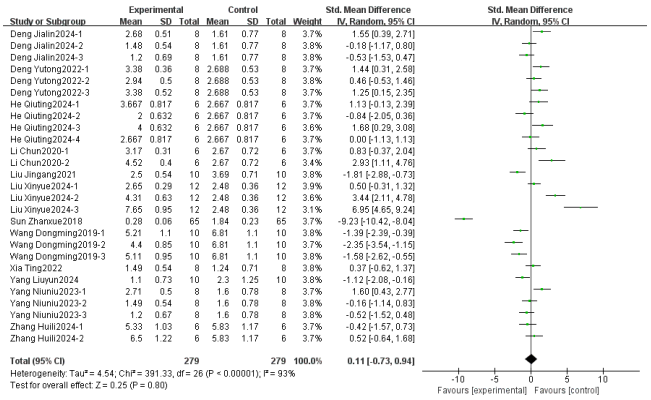

Figure 4: Meta-analysis forest plot comparing skin lesion scores between experimental and control mice

3.4.2 Frequency of scratching

In eight studies [9,14,16-17,19,21-23], the frequency of scratching in mice within the corresponding time period was observed. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 91\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. A random effects model was used for analysis. The results of the meta-analysis showed that the scratching frequency of mice in the experimental group within the corresponding time period was comparable to that of the control group, and there was no statistically significant difference between the two groups (SMD = 0.33, 95% CI = -0.55–1.21, Z = 0.73, P = 0.47), as shown in Figure 5.

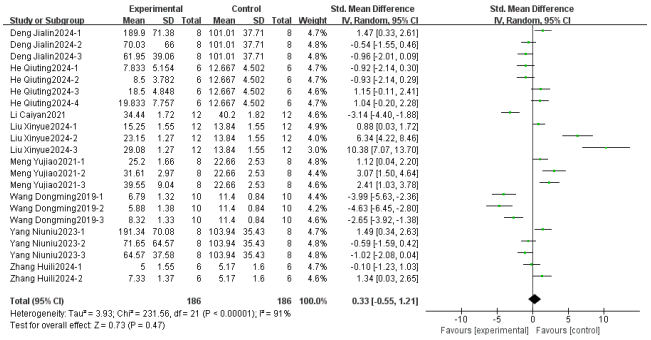

Figure 5: Meta-analysis forest plot comparing scratching frequency between experimental and control

3.4.3 Spleen Coefficient Determination

In four studies [9,11,13,19], the changes in the spleen coefficient of mice were observed. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 86\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. A random effects model was used for analysis. The results of the meta-analysis showed that the decrease in the spleen coefficient of the control group mice was significantly higher than that of the experimental group mice. There was a statistically significant difference between the two groups (SMD = 4.53, 95% CI = 2.77–6.29, Z = 5.05, P < 0.00001), as shown in Figure 6.

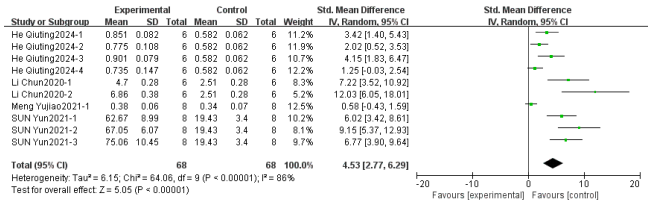

Figure 6: Meta-analysis forest plot comparing spleen coefficients between experimental and control

3.4.4 Epidermal Thickness at the Lesion Site

In four studies [9,21-23], the changes in the skin epidermal thickness at the lesion sites of mice were observed. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 77\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. The random effects model was used for analysis. The results of the meta-analysis showed that the skin epidermal thickness at the lesion sites of the control group mice was significantly lower than that of the experimental group mice, and the difference between the two groups was statistically significant (SMD = 1.84, 95% CI = 0.82–2.85, Z = 3.53, P = 0.0004), as shown in Figure 7.

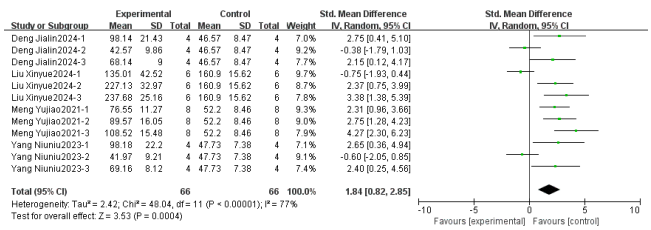

Figure 7: Meta-analysis forest plot comparing epidermal thickness at skin lesion sites between experimental and control mice

3.4.5 Number of Mast Cells in Lesional skin

In four studies [9,17,22-23], the changes in the number of mast cells in the skin lesions of mice were observed. A heterogeneity test was conducted ($P < 0.0001$, $I^2 = 74\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. A random effects model was used for analysis. The results of the meta-analysis showed that the number of mast cells in the skin lesions of the experimental group of mice was comparable to that of the control group of mice, and there was no statistically significant difference between the two groups (SMD = 0.68, 95% CI = -0.19–1.55, Z = 1.54, P = 0.12), as shown in Figure 8.

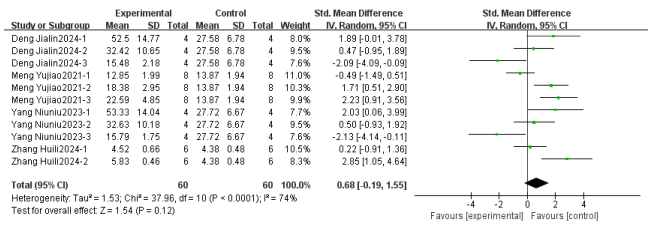

Figure 8: Meta-analysis forest plot comparing mast cell counts at skin lesion sites between experimental

3.4.6 IgE

In six studies [9,11-13,21,25], the changes in serum IgE levels of mice were measured. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 81\%$), indicating significant heterogeneity among the studies. Sensitivity analysis revealed that studies [9], [12], and [13] had a significant impact on heterogeneity. After excluding these three studies, a re-examination was conducted, suggesting that the heterogeneity among the remaining studies was relatively small ($P = 0.13$, $I^2 = 39\%$). A fixed-effect model was used for analysis. The meta-analysis results showed that the serum IgE levels of mice in the experimental group were comparable to those in the control group, and there was no statistically significant difference between the two groups (SMD = -0.13, 95% CI = -0.55–0.29, Z = 0.61, P = 0.54), as shown in Figure 9.

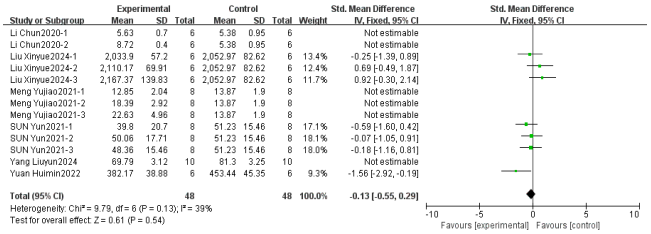

Figure 9: Meta-analysis forest plot comparing serum IgE levels between experimental and control

3.4.7 IL-4

In nine studies [9,11-13,21-25], the changes in serum IL-4 levels in mice were measured. A heterogeneity test was conducted ($P < 0.00001$, $I^2 = 95\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. The random effects model was used for analysis. The results of the meta-analysis showed that the serum IL-4 levels in the experimental group of mice were comparable to those in the control group of mice, and there was no statistically significant difference between the two groups (SMD = 0.09, 95% CI = -1.17–1.35, Z = 0.14, P = 0.89), as shown in Figure 10.

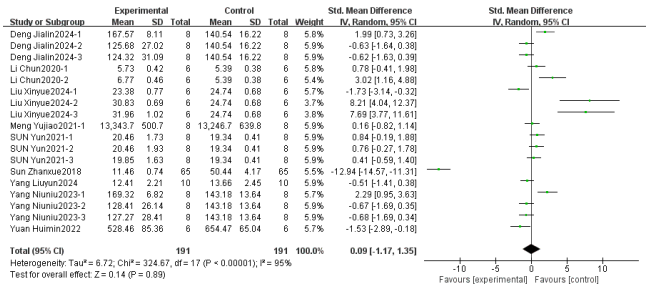

Figure 10: Meta-analysis forest plot comparing serum IL-4 levels between experimental and control

3.4.8 IL-10

In three studies [22-23,25], the changes in serum IL-10 levels in mice were measured. A heterogeneity test was conducted ($P < 0.0001$, $I^2 = 81\%$), indicating significant heterogeneity among the studies. After conducting sensitivity analysis and subgroup analysis, it was found that there was still considerable heterogeneity among the studies. The random effects model was used for analysis. The meta-analysis results showed that the serum IL-10 level in the control group of mice was significantly higher than that in the experimental group of mice, and the difference between the two groups was

statistically significant (SMD = -1.40, 95% CI = -2.45–-0.34, Z = 2.60, P = 0.009), as shown in Figure 11.

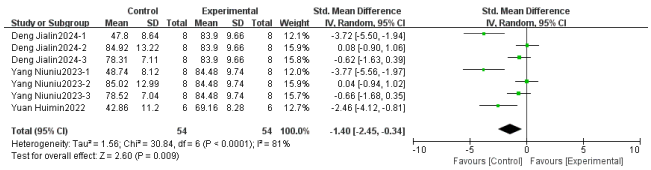

Figure 11: Meta-analysis forest plot comparing serum IL-10 levels between experimental and control

3.5 Publication Bias Test

In this study, funnel plots were used to detect publication bias in the skin lesion scores. The funnel plot results showed that the included literature data were generally symmetrically distributed, as shown in Figure 12. Combined with the results of Egger's test, P = 0.102 > 0.05, suggesting that the risk of publication bias in this study was relatively low.

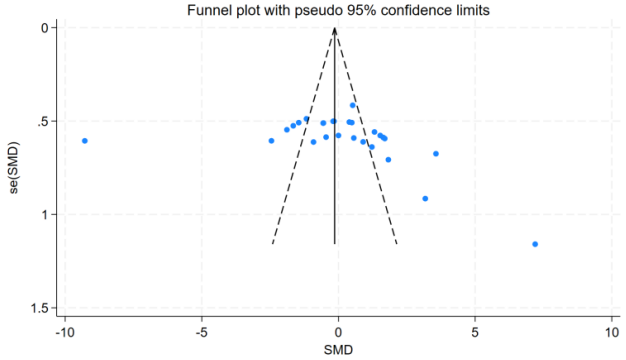

Figure 12: Lesion Score Funnel Chart

4. Discussion

Due to the differences in clinical manifestations and constitutions of patients with atopic dermatitis, according to traditional Chinese medicine theory, there are numerous types of syndrome differentiation and classification. However, damp-heat syndrome is the most common in clinical practice [26]. The *Yangke Xinde Ji* records: "All painful, itchy, and ulcerative sores pertain to the Heart; all dampness, swelling, and fullness pertain to the Spleen. The Heart governs blood, and the Spleen governs flesh. When blood is heated, and flesh is dampened, dampness and heat combine, soaking and spreading incessantly, ulcerating the skin and flesh—thus various sores arise." This elucidates that atopic dermatitis localizes in the Heart and Spleen, with the core pathogenesis being the struggle between dampness and heat. Treatment should therefore focus on clearing Heart-heat and cooling blood, while strengthening the Spleen and draining dampness. The *Zhubing Yuanhou Lun*, in the section on "Jinyin Sores," states: "When children have heat in the Five Zang-Organs, which manifests in the skin and flesh, and is further assailed by external wind-dampness, dampness and heat struggle within the body... hence it is called Jinyin sores." This describes the pathogenesis of AD in children as internal dampness-heat combined with external wind evil, both acting together to produce the disease. The *Yizong Jinjian* records: "Jinyin sores arise from fire, dampness, and wind; yellow water soaks and spreads, resembling scabies, spreading into patches with unrelenting itching. Treatment should clear heat and dispel wind." This indicates that the therapeutic methods of clearing heat, draining dampness, and dispelling wind should be used simultaneously, providing direction for the later treatment of AD. This pattern presents with an acute onset, skin lesions manifesting as erythema, papules, and papulovesicles, accompanied by burning sensation, severe pruritus, and significant exudation, which may coalesce into plaques and generalize throughout the body. The tongue is red with a yellow-greasy coating, and the pulse is slippery and rapid. Treatment focuses on clearing heat and draining dampness.

A total of 16 RCTs were included in this study. The results of the meta-analysis showed that the skin lesion scores, scratching frequency, number of mast cells in the lesion sites, serum IgE levels, and serum IL-4 levels of the mice in the experimental group treated with heat-clearing and dampness-resolving traditional Chinese medicines were comparable to those of the control group. There was no statistically significant difference. These results indicate that the treatment of AD with heat-clearing and dampness-resolving traditional Chinese medicines is equivalent to the treatment with simple Western medicine in the control group. In addition, the analysis results also showed that the spleen coefficient and the epidermal thickness of the lesion sites in the control group mice were significantly lower than those in the experimental group mice. The serum IL-10 level in the control group mice was significantly higher than that in the experimental group mice, and the difference was statistically significant. This indicates that the treatment method using the control group's treatment approach for AD is significantly superior to the traditional Chinese medicine of clearing heat and removing dampness. However, in the current studies included in the analysis, there are relatively few papers that involve the spleen coefficient, epidermal thickness at the lesion site, and serum IL-10 indicators. The results of this analysis have certain limitations. In the future, more related animal experiments need to be conducted to clarify the therapeutic effects of heat-clearing and dampness-eliminating traditional Chinese medicines.

This study has certain limitations: (1) The number of included studies is relatively small, and most of them are Chinese literature with low quality, and no manual search was conducted; (2) There are differences in the species of experimental animals, modeling methods, traditional Chinese medicine prescriptions, administration methods, dosage, and treatment duration among the various studies. For example, there are differences in administration routes, such as external application and intragastric administration, which, to some extent, lead to heterogeneity in the research results; (3) During the quality assessment of the included literature, it was found that there are numerous uncertain bias risks in the included literature. Only five studies described specific random methods, and no related contents, such as blinding and allocation concealment, were involved, which may have potential bias risks.

In conclusion, multiple animal experiments have shown that traditional Chinese medicines with heat-clearing and dampness-resolving properties have comparable efficacy to Western drugs in treating atopic dermatitis. They can significantly improve the skin lesions of AD, lower the levels of serum IgE and IL-4, reduce the number of mast cells in the

skin lesions, alleviate skin itching, and thereby relieve the symptoms of AD. This study is based on animal experiments and can reduce the risk of clinical trial conversion. It provides certain references for clinical trials. However, due to the generally low quality and high heterogeneity of the included literature, more high-quality clinical trials or animal experiments are still needed in the future to further verify the results.

References

[1] Prof G Y, Renert-Yuval Y, Brunner P M. Atopic dermatitis [J]. The Lancet, 2025, 405(10478).

[2] Criado P R, Hélio Amante Miot, Bueno-Filho R, et al. Update on the pathogenesis of atopic dermatitis [J]. Anais brasileiros de dermatologia: S0365-0596 (24) 00176-4.

[3] Chovatiya R. Atopic Dermatitis (Eczema) [J]. JAMA, 2023, 329(3): 268.

[4] Schuler C F, Billi A, Maverakis E,et al. Novel insights into atopic dermatitis. [J]. The Journal of allergy and clinical immunology, 2022.

[5] Afshari M, Kolackova M, Rosecka M, et al. Unraveling the skin; a comprehensive review of atopic dermatitis, current understanding, and approaches [J]. Frontiers in Immunology, 2024, 15(15): 1361005.

[6] Geng R S Q, Sibbald R G. Atopic Dermatitis: Clinical Aspects and Treatments [J]. Advances in Skin & Wound Care, 2024, 37(7): 346-352.

[7] Rossi M, Ferrucci M S, Pinton C P, et al. Drug Survival, Retention, and Persistence of Dupilumab in Adults and Adolescents with Atopic Dermatitis: A Narrative Literature Review. [J]. Advances in therapy, 2024, 42(1): 1-12.

[8] Chen Y. Clinical research progress of Chinese medicine in the treatment of atopic dermatitis [J]. Chin Med Mod Distance Educ Chin, 2023, 21(2): 200-2.

[9] MENG Y J. Study on the regulatory effect and mechanism of Qingre Chushi Decoction and its active components on atopic dermatitis mice and mast cells [D]. Beijing: Beijing University of Chinese Medicine, 2021.

[10] Chen K Y, Ma B, Wang Y N, et al. SYRCLE's risk of bias tool for animal studies [J]. 2014.

[11] Sun Y, Chen G F, Gao J, et al. Protective effects of oxymatrine on atopic dermatitis model mice [J]. Chin. J. Comp. Med, 2021, 31(9): 10-15.

[12] YANG L Y. Model making of atopic dermatitis with damp-heat syndrome combination of disease and syndrome and its intervention with Zhuang medicine Shiduxiao decoction [D]. Nanning: Guangxi University of Chinese Medicine, 2024.

[13] LI C. Study on the Ta-Xi-San power of Effective of Compounds in the Treatment of Atopic Dermatitis [D]. Xianyang: Shaanxi University of Chinese Medicine, 2020.

[14] WANG D M. Therapeutic effect and mechanism of Qingre Qushi Recipe on skin lesions of Th17-dominated atopic dermatitis-like mice [D]. Shanghai: Shanghai University of Traditional Chinese Medicine, 2019.

[15] Ting X, Xiao L, ChangShun L, et al. Network Pharmacology Integrated with Transcriptomics Analysis Reveals Ermiao Wan Alleviates Atopic Dermatitis via Suppressing MAPK and Activating the EGFR/AKT Signaling [J]. Drug design, development and therapy, 2022, 164325-4341.

[16] Li C, Zhang Y, Yuan H, et al. Effect of Mahuang Lianqiao Chixiaodou decoction on the expression of PAR-2 and TRPA1 in sensitized tissues of atopic dermatitis mice [J]. World Chin. Med, 2021, 16(4): 587-591.

[17] ZHANG H L. Clinical and experimental study of Liangxue Qushi Zhiyang Decoction in treating mild-to-moderate atopic dermatitis with blood-heat and dampness accumulation pattern in children [D]. Beijing: Beijing University of Chinese Medicine, 2024.

[18] DENG Y T. Experimental study on the intervention of Qingshi Zhiyang Ointment on atopic dermatitis mice based on Sema3A/NGF related molecules [D]. Beijing: Beijing University of Chinese Medicine, 2022.

[19] HE Q, PANG C, CHEN C, et al. Improvement of Skin Barrier and Anti-inflammatory Mechanism of Huangliansan on Atopic Dermatitis in Mice [J]. Chinese Journal of Experimental Traditional Medical Formulae, 2024: 19-27.

[20] Liu J, Sun Y, Yuan H, et al. Mechanism of improving skin barrier function in a mouse model of atopic dermatitis using Mahuang Lianqiao Chixiaodou decoction and its disassembled formula [J]. Journal of Traditional Chinese Medical Sciences, 2021, 8(04): 309-316.

[21] LIU X Y. Study on the pharmacodynamics, absorption components and mechanism of Phellodendri Chinensis Cortex-Cnidii Fructus herb pair in treating atopic dermatitis [D]. Jinan: Shandong University of Traditional Chinese Medicine, 2024.

[22] YANG N N, SHAO H F, DENG J L, et al. Comparison and mechanism study on the anti-dermatitis effects of the main pharmacodynamic components of Cortex Dictamni including obacunone, dictamnine, and fraxinellone [J]. Journal of Nanjing Medical University (Natural Sciences), 2023, 43(12): 1636-1642, 1649.

[23] DENG J L. The Study of the Inhibit Mechanism of Fraxinellone on the Chronic Itch Caused by Atopic Dermatitis via Regulating IL-31-TRP [D]. Yangzhou: Yangzhou University, 2024.

[24] Xue Z S, Jun J W, Yuan X J, et al. Liang Xue Qu Shi Zhi Yang soup ameliorates dinitrochlorobenzene-induced atopic dermatitis in mice [J]. INTERNATIONAL JOURNAL OF CLINICAL AND EXPERIMENTAL MEDICINE, 2018, 11(10): 10981-10987.

[25] Yuan H, Sun Y, Tang Y, et al. Intervention of the Mahuang Lianqiao Chixiaodou decoction on immune imbalance in atopic dermatitis-like model mice [J]. Journal of Traditional Chinese Medical Sciences, 2022, 9(04): 392-399.

[26] HUI H Z, QI D W, SHI B J, et al. Syndrome differentiation and treatment of atopic dermatitis in traditional Chinese medicine: an overview [J]. Yunnan Journal of Traditional Chinese Medicine and Materia Medica, 2021, 42(10): 83-86.