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Traditional Chinese medicine for pediatric adenoidal hypertrophy: effects on pharyngeal muscle dysfunction based on Qi deficiency and blood stasis

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Abstract

Adenoidal Hypertrophy (AH) in children is commonly accompanied by chronic oral respiration, which may lead to abnormal tension of the perioral muscle groups and persistent upper airway dysfunction. From the perspective of Traditional Chinese Medicine (TCM), these manifestations are closely associated with Qi deficiency and blood stasis. This study summarizes clinical experience in treating AH by correcting oral respiration–induced perioral muscle tension based on this theoretical framework. A retrospective analysis of pediatric patients with AH was conducted. Clinical manifestations included habitual oral respiration, mouth opening, altered perioral muscle tension, and recurrent nasal obstruction. TCM interventions aimed at tonifying qi and promoting blood circulation were administered according to syndrome differentiation. Changes in respiratory patterns, perioral muscle tension, and AH-related symptoms were evaluated before and after treatment. Meta-analysis showed that the overall effectiveness rate was significantly higher in the TCM group compared with control treatments (OR = 4.41, 95% CI: 2.45–7.93, $P < 0.001$). TCM treatment targeting qi deficiency and blood stasis may effectively correct oral respiration–induced perioral muscle tension and improve clinical symptoms of adenoidal hypertrophy in children. These findings support the potential role of integrating TCM with conventional management strategies, while further controlled

studies are needed to confirm efficacy.

Key words: adenoidal hypertrophy; oral respiration; perioral muscle tension; Qi deficiency; blood stasis; traditional Chinese medicine.

Traditional Chinese Medicine (TCM) boasts a rich history and a distinctive framework that has evolved over millennia. Central to TCM is the concept of "Zheng," or disease patterns,¹ which practitioners use to diagnose and treat patients. This diagnostic approach allows for personalized treatment plans that consider the slight differences in symptoms of the same disease, tailoring herbal medicines and acupuncture formulas to the individual. This contrasts with the often more generalized treatment approaches found in Western medicine.

The principles of TCM extend beyond individualized care; they also suggest that patients with different diseases but similar symptoms can benefit from the same therapeutic approaches.² This versatility highlights the holistic nature of TCM, which aims to restore balance and harmony within the body, rather than merely addressing isolated symptoms. This complementary approach is particularly valuable in managing chronic conditions and improving overall well-being.

Despite its long-standing application, there is a growing need for empirical evidence to substantiate the effectiveness and mechanisms of TCM practices.³ Modern research is increasingly focusing on validating these traditional methods through rigorous scientific studies, aiming to bridge the gap between ancient wisdom and contemporary medical science. At the core of TCM philosophy are the concepts of Qi deficiency (vital energy) and blood, which are deemed essential to maintaining health and preventing illness.⁴ Qi deficiency and blood flow throughout the body, supporting its physiological functions and defending against disease. Disruptions or

imbalances in Qi deficiency and blood flow are believed to lead to various health issues, a theory that underpins many TCM treatments.

One commonly recognized syndrome in TCM is Qi deficiency and Blood Stasis. This syndrome is characterized by symptoms such as persistent or tingling pain in specific areas, lumps on the body, and other recurring discomforts.⁵ These symptoms are thought to result from impediments in the flow of Qi deficiency and blood, leading to stagnation and blockages that manifest as physical ailments. Understanding and addressing these syndromes are crucial in TCM, as they aim to restore the smooth flow of Qi deficiency and blood, thereby alleviating symptoms and promoting health. In this context, treating conditions like adenoid hypertrophy with TCM involves identifying and rectifying these imbalances. Adenoid hypertrophy, characterized by the enlargement of the adenoid tissue, often results in breathing difficulties, recurrent infections, and other complications. According to TCM theory, such conditions may be linked to Qi deficiency and blood stasis. By utilizing TCM techniques to harmonize Qi deficiency and blood, practitioners aim to reduce the hypertrophy and relieve associated symptoms, offering a holistic and natural treatment option.⁶ While traditional methods have shown promise, further research is needed to validate these approaches scientifically. Studies focusing on the biochemical and physiological effects of TCM treatments, including their impact on specific conditions like adenoid hypertrophy, are essential to integrate TCM more fully into global healthcare practices. This research can provide the evidence needed to support TCM's effectiveness, ensuring that its benefits are recognized and utilized alongside conventional medical treatments.

Related literature

Hypertrophy Adenoid (HP) in children

Adenoid hypertrophy remains one of the renowned obstructive medical conditions primarily caused by enlarged adenoids, which may be present with or without adenoid infection.⁷ This issue remains more prevalent among children as opposed to adults given that adenoids are known to naturally decline during adolescence. It has been

estimated that around 34.5% of children in China are affected by this condition.⁸ While this condition usually resolves on its own as the adenoids regress with age, it can still lead to important complications. Adenoid hypertrophy is a condition characterized by an enlarged size of the adenoids and may be associated with acute or chronic infections.⁹ Further, adenoids are a collection of lymphoepithelial tissue primarily located within the nasopharynx, known to play a significant part along the Waldeyer's ring, which is positioned along the entrance of the upper aerodigestive tract as given in Figure 1 below.

The adenoids receive blood supply from multiple arteries, including the ascending pharyngeal artery. Certain nerves provide sensory innervation to the adenoids. Adenoid size typically peaks around age 6 or 7 before decreasing during adolescence. Causes for this condition include viral and bacterial pathogens, as well as non-infectious factors like reflux, allergies, and cigarette smoke exposure. In adults, enlarged adenoids can indicate more serious conditions like HIV infection. The complications of enlarged adenoids often lead to issues with middle ear effusion and sleep-disordered breathing.¹⁰ Children with this condition may be at an increased risk of experiencing speech, language, and learning difficulties due to ongoing secondary middle ear effusion. They also face risks related to sleep-disordered breathing, which can lead to children's behavioral problems.

Qi deficiency and blood stasis in the treatment of adenoid hypertrophy

The concept of TCM patterns, or Zheng in Chinese medicine, reflects natural variations in clinical cases. This helps identify patterns and guide TCM treatments with herbal medicine.¹¹ TCM patterns, or Zheng in Chinese medicine, help identify and guide TCM treatments with herbal medicine. The connection between the compatibility of herbal medicines and specific disease mechanisms within TCM is crucial for improving clinical efficacy. Assessing the effectiveness of TCM treatment primarily depends on observing improvements in patients' pattern presentations. In traditional Chinese medicine, Qi deficiency with blood stasis commonly presents among patients with adenoid hypertrophy.¹² Adenoid hypertrophy patients often

display manifestations such as hemiplegia, hypoesthesia pale complexion shortness of breath fatigue spontaneous sweating dull or greasy tongue coating weak or irregular pulse. In treating adenoid hypertrophy using traditional Chinese medicine methods, invigorating Qi deficiency and promoting circulation are deemed the most effective.¹³ Buyang Huanwu decoction has been utilized for nearly two centuries to address issues associated with adenoid hypertrophy by tackling its related syndromes. Naoxintong capsules have also been suggested as an adjunct due to their capacity for enhancing collateral dredging while alleviating Qi deficiency insufficiency and eliminating blood stasis based on theories.

Materials and Methods

Retrieval strategy

From January 2015 to January 2024, searches were conducted across electronic databases, including CNKI, Wanfang, VIP, CBM, and PubMed.

The Chinese terms used were, “children”, “adenoid hypertrophy”, “traditional Chinese medicine”, and “benefiting Qi and removing blood stasis”.

The English terms were, “children”, “adenoid hypertrophy”, “traditional Chinese medicine”, and the Qi and blood stasis.

Literature screening, data extraction, and study quality evaluation were conducted by two reviewers independently. Discrepancies were discussed, and a third reviewer was consulted if necessary.

Literature inclusion and exclusion criteria

Inclusion criteria: i) the literature were all randomized controlled trials of adenoid hypertrophy in children treated with a regimen containing yiQi deficiency and resolving blood stasis, with no restriction on the type of publication, whether blinded or not; ii) the study subjects were all children with adenoid hypertrophy, aged 3-14 years, with no restriction on the sex of the participants; iii) intervention protocols: those who were treated with a regimen containing yiQi deficiency and resolving blood stasis were set up as the observation group, and those who were treated without a

regimen containing yiQi deficiency and resolving blood stasis were set up as there is no restriction on the dosage; iv) the outcome indexes included effective rate, symptom score, and A/N value of lateral nasopharyngeal film.

Exclusion criteria were: i) not consistent with the research object, research purpose or research type of this paper; ii) literature with missing data or obvious errors; iii) literature with loopholes in the research methods or protocols that have no analytical value; iv) duplicated published literature, review literature, case reports, meta-analyses, retrospective studies, or articles of review; v) literature with no clear inclusion or exclusion criteria.

Method of analysis

Arrange two evaluators to independently screen the literature and check with the extracted information, if there is any disagreement, then the two sides will discuss or arrange a third evaluator to make a judgement. Pre-developed information extraction form to extract relevant information, the main contents of which include basic information of the included literature, including author's name, literature name, year of publication, treatment protocol, course of treatment, etc., and statistical baseline characteristics of the study subjects, including the number of cases in each group after grouping, age, gender, disease duration, etc. Specific details of the treatment protocols were presented, and key factors for risk of bias evaluation, outcome indicators and related data were recorded.

Risk evaluation

The Cochrane Handbook for Systematic Evaluators 5.1.0 was used to evaluate the risk of bias for RCTs, including the risk of bias for blinding, random allocation methods, etc.

Statistical methods

SPSS26.0 statistical software was used for data analysis. Mean $\pm$ standard

deviation ($\bar{x} \pm s$) was used to indicate the normal distribution of measurement data, one-way ANOVA was used to compare the data of multiple groups, and LSD method was used to test the comparison of data between groups if the variance was uniform; the count data were expressed as the number of cases (%), and χ^2 test was used to compare the data between groups. Effectiveness evaluation was performed using Review Manager 5.4.1, and dichotomous data were analysed using Odds Ratio (OR) as an indicator of effect size, and 95% Confidence Intervals (CIs) were used to assess the overall parameters. Heterogeneity between studies was assessed using the I^2 test, and the combined amount was calculated using a fixed-effects model if $I^2 \leq 50\%$, and a random-effects model if $I^2 > 50\%$, with $P < 0.05$ being statistically significant differences in the comparison of the variables.

Results and analysis

Retrievals

Fifty-eight pieces of relevant literature were obtained by searching databases, and six randomised controlled trials were finally included after a layer-by-layer screening (after eliminating duplicates as well as reviewing the content of the literature).

Basic characteristics of the included literature

Six randomised controlled trials were finally included in this study, all of which were in the Chinese language, with a total of 6 randomised controlled trials and a total of 520 patients, of which 260 were in the observation group (treatment group) (with the YiQi deficiency and Huayu protocol) and 260 were in the control group (without the YiQi deficiency and Huayu protocol). The basic characteristics of the included literature are detailed in Table 1.

Evaluation of risk of bias in the included literature

The six randomised controlled trials included in the study were evaluated one by

one in terms of sequence generation, blinding, allocation concealment, selective outcome reporting, incomplete outcome information, and other biases.

Although all included studies reported random sequence generation and allocation concealment, the reporting quality of some older trials was limited. Therefore, the risk of bias assessment was conducted cautiously based on available methodological information.

In terms of sequence generation, all six were at low risk; in terms of allocation concealment, all six were at low risk, and the results of quality evaluation are shown in Figure 2.

Meta-analysis results

Meta-analysis of overall efficiency

Five of the included literature contained the outcome indicator of total effective rate, and the test of heterogeneity of the five literature showed $P = 0.87$ and $I^2 = 0\%$, suggesting that the heterogeneity of the effect sizes among the reports was relatively small, so the analysis was conducted using the fixed-effect model, and the results showed that the total effective rate of the observation group was higher than that of the control group [$Z = 4.95$, $OR = 4.41$, 95% CI (2.45, 7.93), $P < 0.001$], see Figure 3.

Meta-analysis of total symptom score

Two of the included articles included the total symptom score as an outcome indicator, and the heterogeneity test of the two articles showed $P < 0.01$ and $I^2 = 97\%$, suggesting that the heterogeneity of the effect sizes among reports was large, and therefore the random effects model was used to analyse the results, which showed that the total symptom score of the observation group was lower than that of the control group in all cases [$Z = 1.69$, $MD = -2.83$, 95% CI (-6.10, -0.45)], see Figure 4 [$P < 0.001$, 0.45), $P < 0.001$].

Meta-analysis of A/N ratio

Three of the included papers included the outcome indicator of A/N ratio, and the test

of heterogeneity of the three papers showed $P < 0.001$ and $I^2 = 100\%$, suggesting that there was a large heterogeneity of effect sizes among the reports, and therefore the random effects model was used to analyse the results, which showed that all of the A/N ratios of the observation group were lower than those of the control group [$Z = 7.17$, $MD = -0.11$, 95% $CI (-0.14, -0.08)$, $P < 0.001$], see Figure 5.

Sensitivity analysis

The heterogeneity tests were not significantly altered when the included studies were individually excluded article by article and switched to a random effects model, suggesting that the present results are relatively robust and reliable.

Discussion

Adenoid hypertrophy can lead to a variety of physical and mental health problems, but surgical removal carries risks such as anesthetic complications, bleeding and immunosuppression.¹⁴ Despite the potential associated risks, patients prefer montelukast and intranasal corticosteroids. However, there is limited clinical evidence to support the therapeutic efficacy of intranasal glucocorticoids for adenoid hypertrophy.¹⁵ Better treatment options are needed to address these shortcomings. In China, internal and external treatments for allergic rhinitis are considered.¹⁶ Studies have shown that oral Chinese medicine may be a safe and effective treatment. In addition, AAT, a unique exogenous treatment of TCM, has been found to positively affect children with AH by modulating the immune system.¹⁷ However, there is limited research on TCM treatment for AH outside of China and no evidence to support the efficacy of oral TCM in combination with conventional Western medicine. In this study, we examined the effectiveness of a regimen containing YiQi deficiency and Huayu in the treatment of adenoid hypertrophy in children, and the results showed that a regimen containing YiQi deficiency and Huayu in the treatment of adenoid hypertrophy in children was better than conventional treatment in terms of increasing the overall treatment efficacy rate, and improving the degree of Chinese medicine symptomatology and nasopharyngeal airway obstruction.¹⁰

According to the results, a regimen that includes YiQi deficiency and Huayu was better than standard treatment in improving the overall effectiveness rate. The overall effectiveness rate, pertaining to the TCM clinical evaluation criteria, revolves around the level of improvement in symptoms, including the size of the adenoids, and is a frequent benchmark in TCM clinical studies involving children.

The substantial heterogeneity observed in total symptom score and A/N ratio outcomes may be attributed to differences in herbal formulations, treatment duration, diagnostic criteria, and outcome measurement methods across studies. Additionally, variations in patient characteristics and disease severity may have contributed to the observed heterogeneity.

This suggests that compared with conventional treatment in Western medicine, the use of a programme containing yiQi deficiency and resolving blood stasis in the treatment of adenoid hypertrophy in children has a more obvious advantage, which can significantly improve the clinical symptoms of children with adenoid hypertrophy and enhance the therapeutic efficacy. Previous studies have shown that the treatment of adenoid hypertrophy with Chinese medicine has significantly improved the immune function of patients. This may be related to the fact that the drugs used in the regimen containing the benefit of Qi deficiency and resolving blood stasis mainly include astragalus, trigonelline, curcuma longa, angelica, saffron, and chuanQi deficiencyong, etc. Among them, astragalus is an important drug for benefiting Qi deficiency and strengthening the spleen, and its power can make Qi deficiency and blood abundant and circulate without obstruction, so that stagnation disperses and the veins and collaterals flow freely, and it thus serves as a monarch. Angelica sinensis and saffron join hands to enter the liver, specialising in attacking the stagnation of old blood, harmonising Qi deficiency and blood, so that distension and fullness can be eliminated. Angelica sinensis is also able to tonify blood, driving away evil without harming the positive Qi deficiency. Rhizoma Chuanxiong is pungent, warm and penetrating into the liver and gallbladder, invigorating blood and promoting circulation of Qi deficiency, resolving blood stasis and dispersing stagnation. Sanguisorba and Curcuma longa are used together to increase the ability to break up

Blood and move Qi deficiency, eliminate swelling and dissipate lumps, and serve as auxiliary ministers. Codonopsis, tonifying the middle Jiao, strengthens the spleen and lungs, and stabilises the foundation. Glycyrrhiza glabra is used to harmonise all the medicines so that they can work together harmoniously to tonify Qi deficiency and activate blood circulation, remove blood stasis and clear the channels, and dissipate swelling and nodules. In addition, some studies have confirmed that the treatment of adenoid hypertrophy with a regimen containing beneficial Qi deficiency and resolving blood stasis can exert a variety of effects related to the regulation of immunity, anti-inflammation, antioxidant mechanisms, and suppression of coughing, which can reduce the side effects and improve the therapeutic effect at the same time. The results of our study suggest that the treatment of adenoid hypertrophy in children with a protocol containing beneficial Qi deficiency and resolving blood stasis has a reliable efficacy and can be an ideal treatment option for children with AH.

Conclusions

The treatment of adenoid hypertrophy in children with the YiQi deficiency and Huayu-containing regimen was superior to conventional treatment in terms of increasing the overall treatment efficacy, improving TCM symptoms and the degree of nasopharyngeal airway obstruction, suggesting that the combination of the YiQi deficiency and Huayu-containing regimen with conventional treatment with Western medicine may be a feasible long-term strategy for the management of children with AH. This study supports that the combination of TCM therapy and conventional treatment offers a promising avenue for improving the prognosis of patients with AH. Further studies are needed to continue to explore the synergistic effects of combination therapy and to establish broader clinical evidence to support its use.

Limitations

This study on treating AH with Qi deficiency stagnation and blood stasis syndrome in TCM faces several limitations. The evidence for the effects of Qi deficiency and blood stasis on AH patients across different ailments is insufficient, limiting the

generalizability of the findings. Additionally, there is no consensus on the best treatment for chronic adenoiditis, and responses to antibacterial therapies post-adenoidectomy vary widely. The study's focus on a specific TCM pattern may not cover the diverse presentations of AH. More robust clinical trials and interdisciplinary cooperation are needed to validate these findings and establish a comprehensive treatment paradigm for AH.

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Contributions

Hao Ling and Mingyue Jiang, conceptualization, data curation, formal analysis, writing – original draft; Jiani Wu and Yawei Wang, investigation, methodology, validation; Xianzhi Ren, resources, software, visualization; Chenchen Ye, funding acquisition, project administration, supervision, writing – review & editing. All authors have read and approved the final manuscript.

Conflict of interest

The authors declare no potential conflict of interest, and all authors confirm accuracy.

Ethics approval and consent to participate

Not applicable. This study is a systematic review and meta-analysis of previously published randomized controlled trials, and does not involve the collection of primary data from human subjects or animals. Therefore, ethical approval and informed consent are not required.

Availability of data and materials

All data supporting the findings of this meta-analysis are derived from the studies cited in the reference list. The extracted summary data and analysis outputs are fully presented in the tables and figures within this article. No additional datasets were generated or analyzed during the current study.

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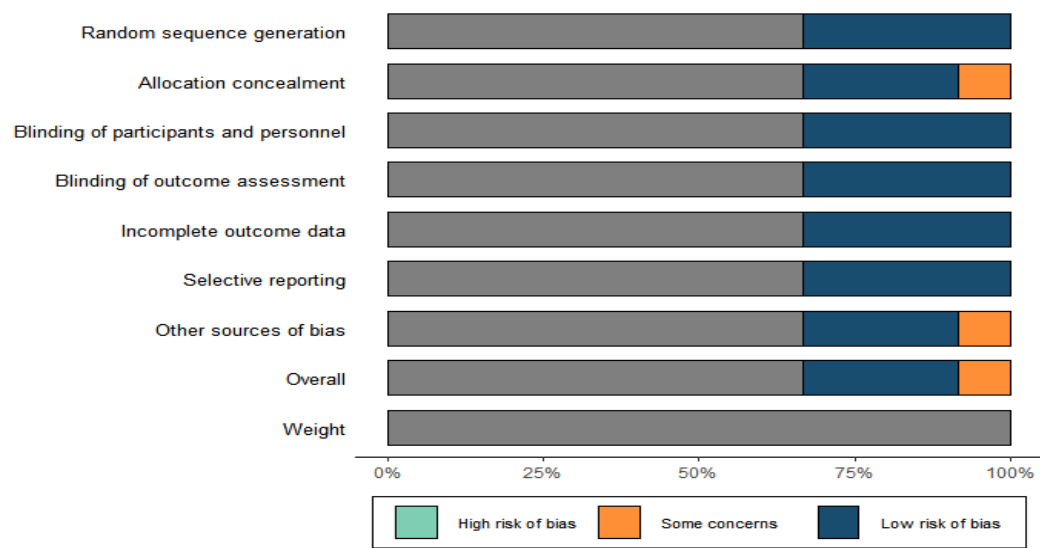


Figure 1. Adenoid hypertrophy.

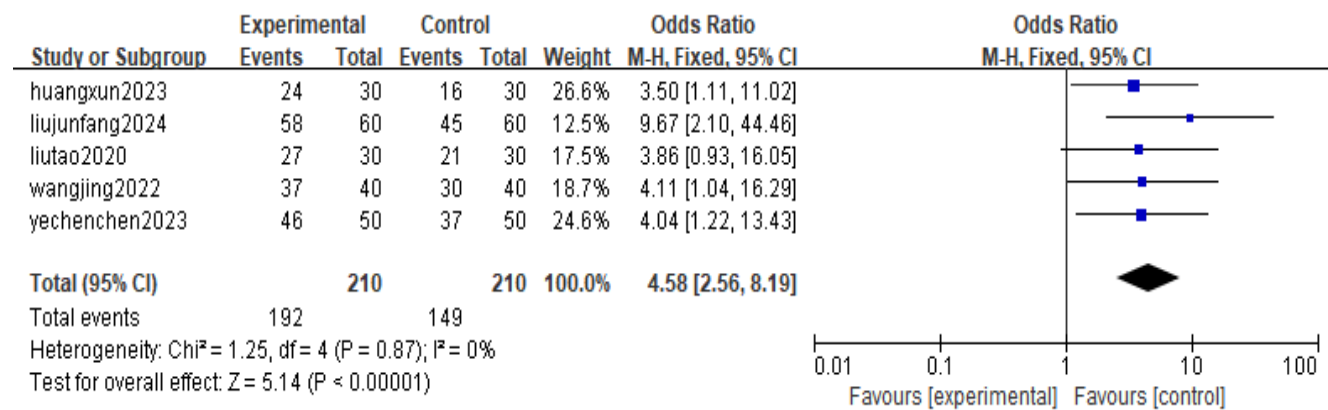


Figure 2. Risk of bias map of the literature included in the analysis.

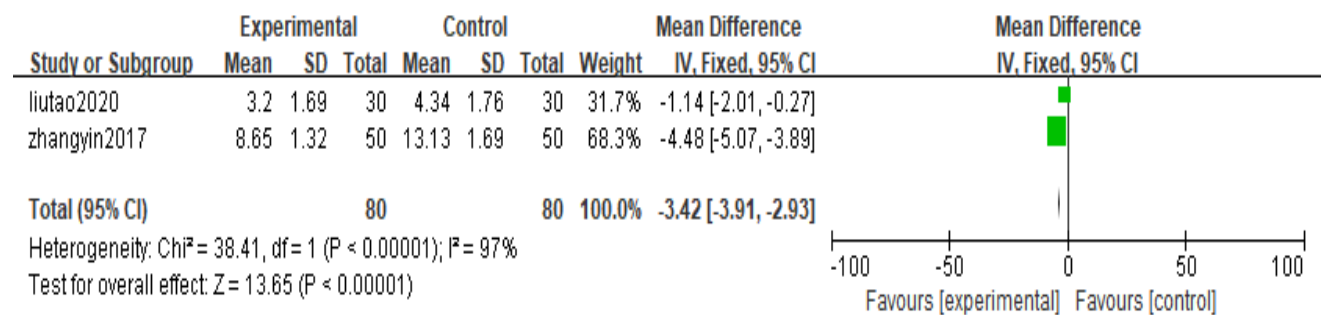


Figure 3. Forest plot comparing overall treatment effectiveness between the TCM intervention group and control group.

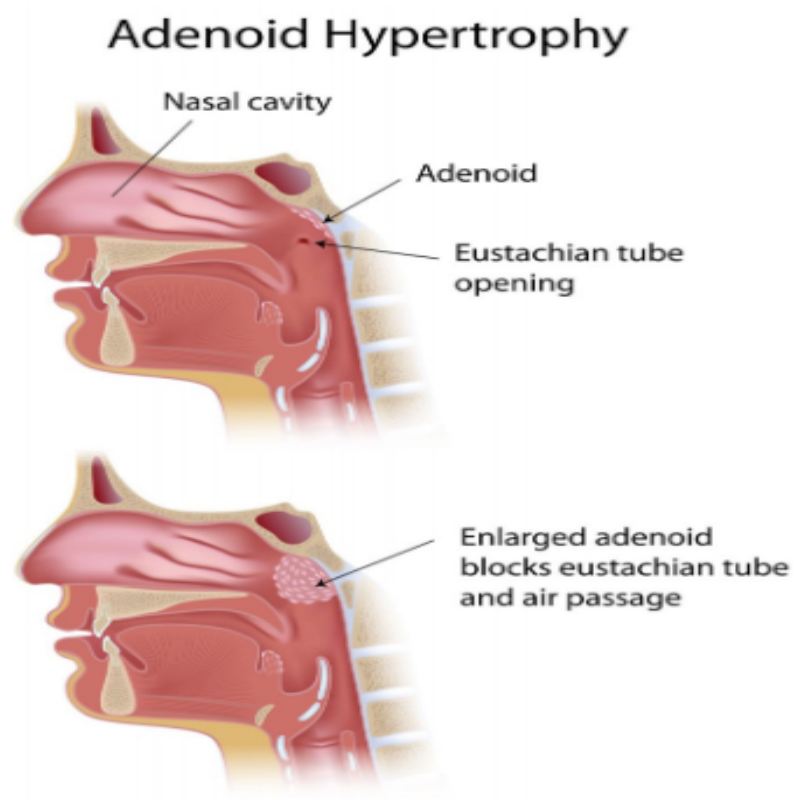


Figure 4. Meta-analysis of total symptom score

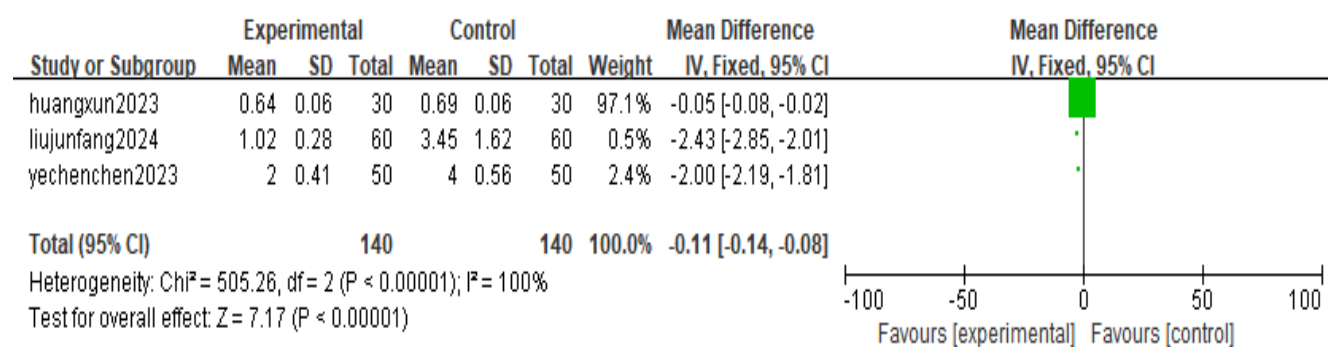


Figure 5. Meta-analysis of A/N ratio.

Table 1. Characteristics of the included literature.

Author	year	Sample size (cases)	Observation group treatment programme	Control group treatment protocol	treatments	outcome indicator
Wang Jing et al.	2022	40/40	Xiong Ming Zhao empirical formula plus and	Furosemide Mometasone acid nasal	4 weeks	Main symptom score and total

[18]			minus oral administration	spray nasal spray combined with montelukast sodium chewable tablets for oral administration		score, total score of blood stasis syndrome, adenoid volume, total effective rate
Qiu L et al. [19]	2019	NR	Qingxian Fang + Flixonase nasal spray	Flixonase nasal spray	NR	Clinical efficacy; sleep quality; respiratory function
Zhao X et al. [20]	2023	45/45	Chinese Herbal Soup Xianfang Eliminating Drink for Oral Use	Mometasone Furoate Nasal Spray Nasal Spray, Oral Western Medicine	1 month	A/N ratio, OSA-18 score, Chinese medicine evidence points, overall effective rate
Ding F et al. [21]	2019	NR	Mometasone furoate nasal spray + Biyuan Tongqiao Granules	Mometasone furoate nasal spray	NR	Clinical efficacy; adenoid hypertrophy-relat ed symptoms
Liu J et al. [22]	2017	50/50	formula for treating anorexia and expelling blood stasis	Mometasone nasal spray	6 weeks	Total TCM Symptom Score, Electronic Nasopharyngosc opy Score, Adverse Reactions
Liu Junfang et al. [23]	2024	60/60	Lui's Three sequential therapy	Budesonide spray, montelukast sodium chewable tablets oral	6-10 weeks	Overall effectiveness rate, symptom score, A/N ratio