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ORIGINAL

External treatment methods of Traditional Chinese Medicine for Insomnia in Patients with hypertension: Network Meta-analysis

Métodos de tratamiento externo de la medicina tradicional China para el insomen pacientes con hipertensión: red meta-análisis

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ABSTRACT

Insomnia is a mutual comorbidity in hypertensive patients, complicating the management of both conditions. Traditional Chinese medicine (TCM) offers various external treatments, including acupuncture, acupressure, and cupping, which have demonstrated the potential to improve sleep quality and regulate blood pressure. The goal of the network meta-analysis is to compare the efficacy of various external TCM interventions in treating insomnia in patients with hypertension. Comprehensive research for RCTs published between January 2019 and December 2025 is shown in a number of databases, such as PubMed, the Cochrane Library, Web of Science (WoS), and others. The analysis focused on trials evaluating the impact of external TCM treatments on insomnia and blood pressure in hypertensive patients. Utilizing a network meta-analysis methodology, the relative efficacy of acupressure, acupuncture, and cupping in alleviating insomnia symptoms and reducing blood pressure is compared. The Cochrane Risk of Bias tool is used to evaluate the quality of analyses. The analysis included 35 RCTs with a total of 3200 patients. According to the data, acupuncture is the greatest treatment for treating sleepiness and decreasing both systolic and diastolic blood pressure levels. Acupressure and cupping were also effective but to a lesser extent than acupuncture. The meta-analysis suggests that external TCM treatments, especially acupuncture, provide significant benefits for managing insomnia and improving blood pressure in hypertensive patients. However, further research is necessary to refine treatment protocols and optimize outcomes.

Keywords: Traditional Chinese Medicine (Tcm); Insomnia; Hypertensive Patients; Acupuncture; Blood Pressure.

RESUMEN

El insomes una comorbilidad mutua en pacientes hipertensos, complicando el manejo de ambas condiciones. La medicina tradicional China (MTC) ofrece varios tratamientos externos, incluyendo acupuntura, acupresión y catación, que han demostrado el potencial para mejorar la calidad del sueño y regular la presión arterial. El objetivo del metanálisis de la red es comparar la eficacia de varias intervenciones externas de MTC en el tratamiento del insomen pacientes con hipertensión. La investigación integral para ECA publicada entre enero de 2019 y diciembre de 2025 se muestra en varias bases de datos, como PubMed, the Cochrane Library, Web of Science (WoS) y otras. El análisis se centró en ensayos que evaluaron el impacto de los tratamientos con MTC externa sobre el insomy la presión arterial en pacientes hipertensos. Utilizando una metodología de metanálisis de red, se compara la eficacia relativa de la acupresión, la acupuntura y las cataciones para aliviar los síntomas del insomy reducir la presión arterial. La herramienta Cochrane de riesgo de sesse utiliza para evaluar la calidad de los análisis. El análisis incluyó 35 ECA con un total de 3200 pacientes. Según los

datos, la acupuntura es el mejor tratamiento para tratar la somnolencia y la disminución de los niveles de presión arterial sistólica y diastólica. La acupresión y las cataciones también fueron efectivas, pero en menor grado que la acupuntura. El metanálisis sugiere que los tratamientos externos con MTC, especialmente la acupuntura, proporcionan beneficios significativos para controlar el insomy mejorar la presión arterial en pacientes hipertensos. Sin embargo, es necesaria más investigación para refinlos protocolos de tratamiento y optimizar los resultados.

Palabras clave: Medicina Tradicional China (MTC); Insom; Pacientes Hipertensos; Acupuntura; Presión Arterial.

INTRODUCTION

Sleep is a fundamental physiological activity that enables human existence and well-being. However, sleep problems are usually triggered by long-term mental stress, high-stress employment, and other diseases.[1] Insomnia is growing increasingly widespread and becoming a serious public health issue. Medical treatment is typically chosen by patients with insomnia; however, long-term medicine has significant adverse effects and is expensive.[2] Insomnia is frequently associated with various physical health conditions, with hypertension being one of the most prominent comorbidities. Chronic hypertension, which is characterized by persistently elevated blood pressure, is a significant risk factor for heart disease and frequently coexists with sleep disorders, especially insomnia.[3] The relationship between hypertension and insomnia is bidirectional; hypertension exacerbates sleep disturbances and insomnia in turn elevates the risk of developing worsening hypertension. The coexistence of these two conditions not only affects a person's overall health but also obscures the treatment landscape.[4] Traditional pharmacological treatments, which include antihypertensive medications and sedatives, are often used in managing both conditions. To encourage energy flow and restore balance, acupuncture is used by TCM practitioners, who insert small needles into particular body parts.[5] Herbal remedies such as Sour Jujube Seed and Free and Easy Wanderer are often used with sedative effects and the ability to harmonize the body's internal system.[6,7] TCM's approach to treating insomnia in patients with hypertension is multifaceted. The patient's overall health and the specific imbalances thought to be generating their symptoms are significant factors.[8] Hypertension is high blood pressure and insomnia coexists with security consideration that some treatments confer more benefits than others. External techniques and treatments, such as acupuncture, are especially considered good for hypertensive patients since they stimulate some acupuncture points believed to affect blood pressure: acupuncture points in the head, neck, and limbs induce relaxation, increase sleep eminence and diminish blood pressure.[9] Acupuncture is a significant fact of TCM, as it stimulates the body for natural healing, circulation improvement, and autonomic nervous system regulation by reaching acupoints with fine needles.[10] Most analyses have determined that acupuncture reduces sleep disturbances and improves the sleep quality of insomniac individuals.[11] Acupuncture is also reported to reduce blood pressure, particularly in individuals suffering from mild to moderate hypertension.[12] Popular external TCM therapies like acupressure and cupping are well-known for their capacity to treat a variety of ailments, including insomnia and hypertension. Acupressure is the development tool associated with employing a pressure point and stimulating specific acupuncture points to restore resonance or balance and relieve symptoms. Cupping entails bringing up blood flow, which relaxes stiff muscles and promotes wellbeing. Although not as significantly as in acupuncture instances, both therapies have had a positive impact on blood pressure and sleep quality, which benefits the patient's health. The two methods present a natural intervention against comorbid insomnia in hypertensive patients. However, these treatments come with various limitations, such as adverse side effects, dependency, and the potential for drug interactions. Given these challenges, there has been an increasing interest in exploring alternative, complementary therapies that manage both hypertension and insomnia holistically and sustainably. The research compares the efficiency of acupuncture, acupressure and cupping in treating insomnia and regulating blood pressure in hypertensive patients through a network meta-analysis of measured trials that were randomized.

METHOD

The objective is to measure and associate the efficacy of external TCM therapies, such as acupuncture, acupressure, and cupping, in treating insomnia and lowering blood pressure in hypertensive patients. Using a meta-analysis technique, this study summarizes the results of many peer-reviewed studies that analyze the comparative effectiveness of external TCM treatments for managing insomnia in hypertensive patients. PRISMA guidelines provide thorough, accurate, and transparent evaluations. The phases of PRISMA development include article selection criteria, search strategies, data extraction, results synthesis, and analytical techniques.

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Data Bases and Search Strategies

Numerous databases, including WoS, Cochrane Library, PubMed, and CINAHL, are included in the extensive literature search for RCT research published between January 2019 and December 2025. The search comprised all analyses considered to reduce the possibility of publication bias, including studies published in English. A review of position lists of relevant articles allowed for the identification of studies.

Eligibility criteria

The PICOS framework serves as the basis for the preset inclusion criteria selection method in this research. Selection for further analyses in this study is done in three steps. First, the title and abstract are examined for relevance to the study subjects. Next, quality assessments are conducted and inaccessible publications are excluded and records are not retrieved. Finally, the full content of the articles that passed the previous steps is reviewed thoroughly, with those deemed suitable considered for inclusion in the research.

Selection of Studies

After gathering data from various sources, an initial evaluation is conducted based on the relevance of the research objectives. The Cochrane risk of bias method is then used to evaluate the study's quality. The final selection process incorporates the following exclusion and inclusion criteria.

- Inclusion criteria: RCTs with hypertension patients who have been diagnosed with insomnia that were published between January 2019 and December 2025. The studies evaluate the effectiveness of external TCM therapies, including acupuncture, acupressure, or cupping, and report on both sleep quality and blood pressure outcomes. Only the published studies in English with full-text availability are considered for inclusion.
- Exclusion criteria: Non-RCTs, observational research, case reports, and editorials are excluded. Population does not match. Studies that do not report on both insomnia and blood pressure outcomes is also excluded, as well as duplicates publications or studies with insufficient data for meta-analysis. Additionally, patients with secondary hypertension due to specific underlying diseases, such as renal or endocrine disorders, are not considered.

Data collection and extraction

The analysis includes 35 RCTs with 3200 patients, selected for their relevance to insomnia and hypertension treatment. Data collection and extraction for this network meta-analysis involved a comprehensive review of RCTs published between January 2019 and December 2025. Identify relevant studies evaluating the impact of external TCM treatments such as acupuncture, acupressure, and cupping on insomnia and blood pressure management in hypertensive patients. Studies were included if they focused on external TCM interventions for improving sleep quality and regulating blood pressure in hypertensive individuals. The selection process adhered to strict inclusion and exclusion criteria, ensuring that only high-quality RCTs were considered. Data extraction focused on key variables such as patient characteristics, treatment protocols, and outcomes related to insomnia severity and blood pressure measurements. Studies were excluded due to the original text, missing raw data and wrong outcome reported in the conference.

RESULTS

The analysis included 35 studies based on the selection criteria established. Figure 1 depicts the PRISMA technique briefly.

Quality Assessment

The systematic review included all studies that met the predefined eligibility criteria. The meta-analysis, however, only included studies with sufficient data. Study is excluded from the meta-analysis if it does not provide the required missing data.[13] TCM's use in treating hypertension patients' sleeplessness is governed by precise standards for quality assessment. Each study is assessed based on four key questions: (1) whether the study explicitly stated its objective regarding the impact of TCM treatments on insomnia and blood pressure in hypertensive patients; (2) whether the methodology, including work design, participant features, intervention type, and outcome measures, is clearly described; (3) whether the results were supported by robust data analysis; and (4) whether the study contributed meaningfully to the existing literature on hypertension and sleep disorder interventions. Each criterion is given a score of YES (2 points), Partial (1 point), and NO (0 points). Studies scoring ≤4,0 were excluded to ensure that only high-quality, relevant research was included in the review. The Cochrane Risk of Bias Assessment Tool is used. A rating of strong, low, or some concern is assigned to each prejudice category. Figure 2 illustrates the risk of bias evaluation for external TCM therapies in hypertensive patients, and table 1 lists the fundamental characteristics of the included research.

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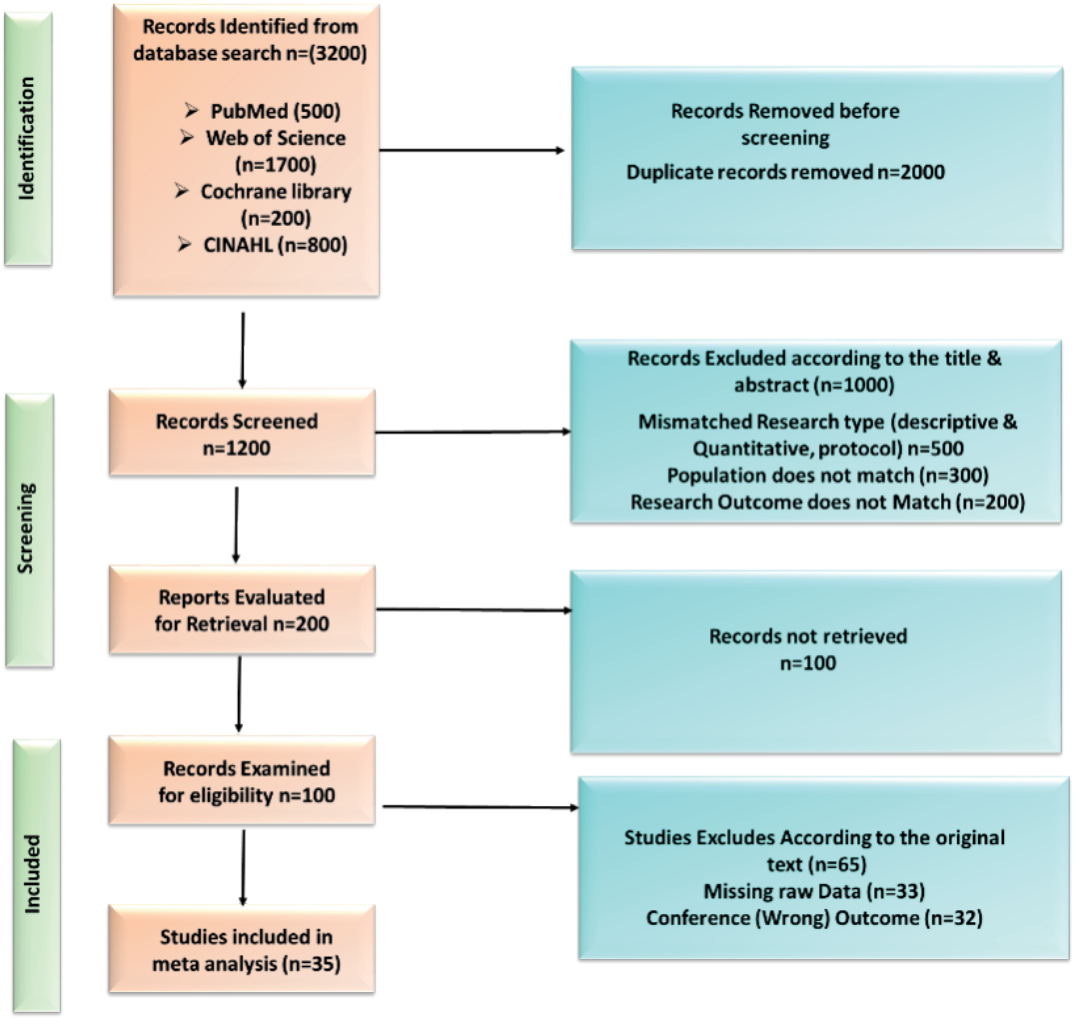

Figure 1. Framework of PRISMA

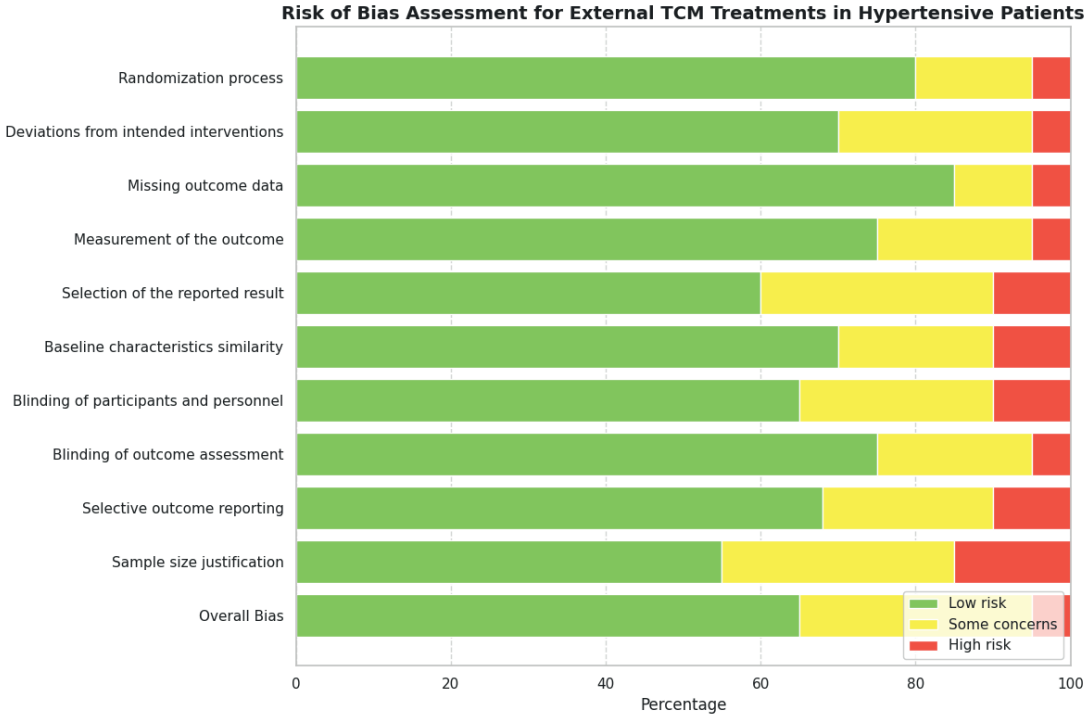

Figure 2. Consequence of risk of bias assessment

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The percentage distribution of low risk, some concerns, and high risk for several criteria is displayed in the graph, which illustrates the evaluation of different biases in a study. While difficulties in missing data and sample size justification suggest more danger, the majority of components, including blinding and randomization, have minimal risk.

Table 1. An outline of the core characteristics of the included research

Reference	Sample size	Age	Interventions	Control group	Outcome indicators	Intervention cycle
Yao et al.[14]	36/36	46,9±8,3	Taijiquan	Usual care	PSQI	8 weeks,2 time
Siu et al.[15]	105/110	67,3±5,3				12 weeks,3 time
Guoqing et al.[16]	46/49	54,8±10,3				24 weeks,3 times
Luo and Shasha[17]	157/158	18,58±2,25				16 weeks,3 times
Hong et al.[18]	19/19	20,47±1,47	Baduanjin	Health Education		10 weeks,4 times
Ru et al.[19]	49/49	69±5,73	Taijiquan	Usual care		24 weeks,2 times
Xiang et al.[20]	32/32	48±17,64	baduanjin			4 weeks,4 times
Tan et al.[21]	42/42	68,95±7,21				12 weeks,5 times
Zhang et al.[22]	64/63	67,01 ± 3,22	Jinjiang			4 weeks
Zhang et al.[23]	25/25	57,88 ± 13,83				4 weeks,3 times
Liu et al.[24]	44/43	67.± 13,3	baduanjin	Usual care		2 weeks,1 times

Statistical analysis

Statistical significance is determined at $p < 0,05$ and the data is analyzed using Stata 18 software for network meta-analysis, using an occurrence method with a random effects model and CI (95 %). Direct and indirect pair-wise evaluations were used to display the findings from the network meta-analysis. The SUCRA is utilized to evaluate the effectiveness of various therapies for insomnia, with lower SUCRA values indicating less effective treatments. Finally, plots assess the possibility of publication bias for each of the outcome measures.

The research compares the efficiency of acupuncture, acupressure and cupping in treating insomnia and regulating blood pressure in hypertensive patients through a network meta-analysis of randomized measured trials. This section reviews various studies' outcomes in forest plots and network meta-analyses to compare multiple treatments for insomnia in hypertensive patients across different interventions to examine effectiveness and side effects.

Network meta-analysis

Table 2. Summary of SUCRA

Interventions	Total effective	Quality of sleep	Incidence of somnolence	Dry mouth	Dizziness
SSYXJN	85,62	73,20	54,50	56,64	-
ASBNY	88,41	98,21	49,80	55,81	57,20
ZSASW	87,42	50,70	75,84	78,41	-
SGJYJN	84,64	54,32	48,30	47,12	39,10
YDXNT	73,30	67,42	52,23	49,12	67,80
YXQNKL	69,70	63,20	19,14	28,43	32,10
TMJN	62,91	50,13	39,43	67,43	39,43
YXASW	62,43	67,17	74,23	74,31	74,23
DXM	53,20	69,12	56,30	67,21	66,30
ESZ	58,23	76,20	38,12	43,54	-
LEM	75,34	38,21	33,32	-	43,32
MT	71,12	86,13	65,17	86,74	75,17
QTP	86,32	54,32	61,34	34,56	-

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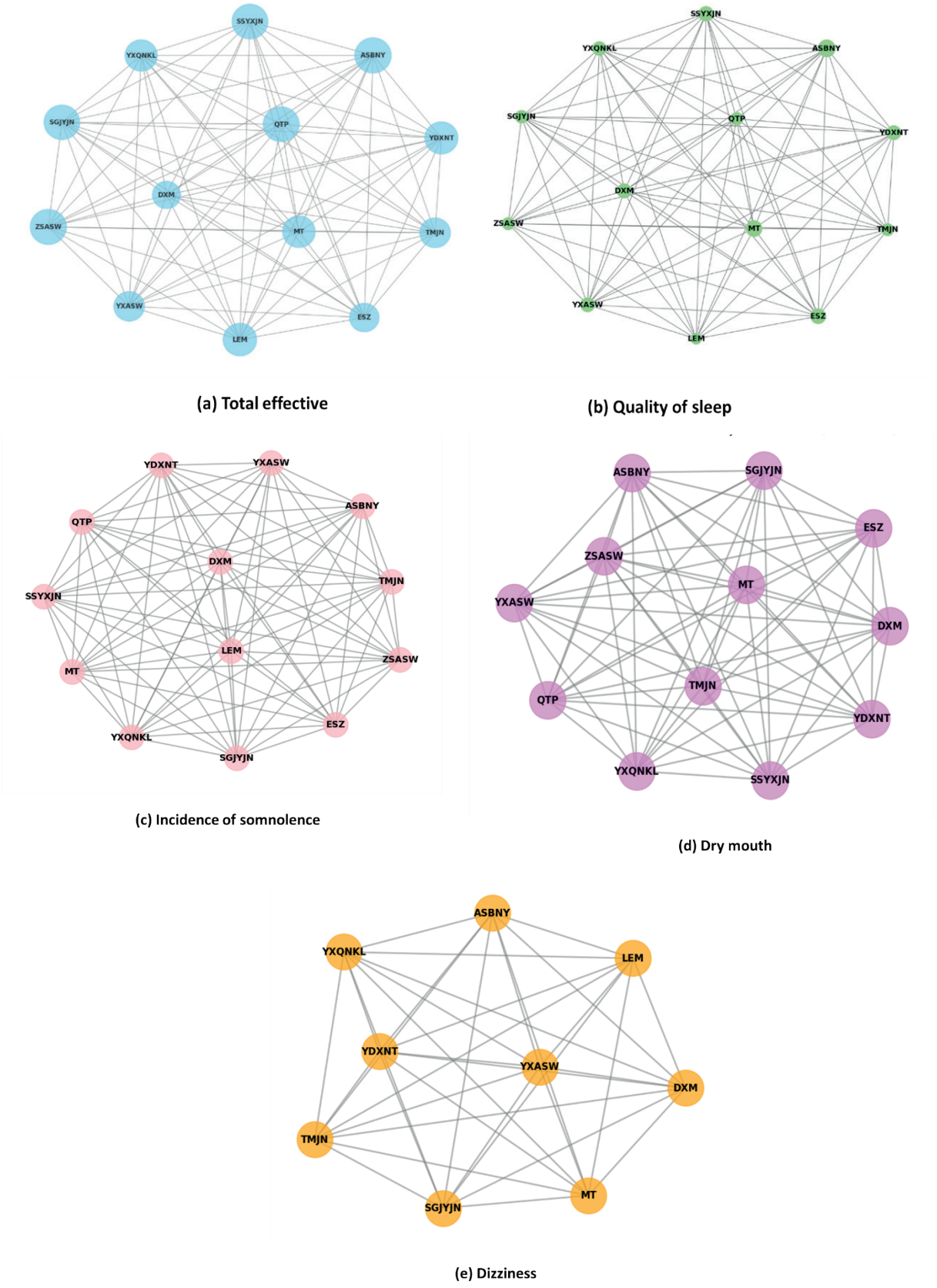

Figure 3. Network analysis

The pre-defined inclusion and exclusion criteria for RCTs are finally included in NMA. TCM treatments for insomnia in hypertensive patients focus on five key factors: total effectiveness, quality of sleep, incidence of somnolence, dry mouth, and dizziness. Total effectiveness is an overall indicator of the effectiveness of treatment in the improvement of insomnia, higher percentages indicate better results. Quality of sleep is

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a measure of the extent to which treatment improves one's sleep quality. Incidence of Somnolence is the percentage of patients with side effects of excessive drowsiness or sleepiness. There are two example therapies such as ASBNY and SSYXJN, show good efficacy and quality of sleep, have varying degrees of side effects, including dizziness, dry mouth, and somnolence. The therapy with the highest expression of these adverse problems. Dry mouth and dizziness are side effects monitored, showing percentages of patients with these symptoms. These measures view the benefits and risks of each treatment under consideration. Table 2 shows the summary of SUCRA. Figure 3 depicts the network analysis.

ASBNY has the highest total effective (88,41 %) and quality of sleep (98,21 %) scores. SSYXJN and ZSASW affect total effectiveness quite a bit (85,62 % and 87,42 %, respectively), but their quality of sleep scores are lower than that of ASBNY. Interventions such as YXQNKL (69,70 % effective) and TMJN (62,91 % effective) have low effectiveness. YXASW and DXM have high rates of dry mouth and dizziness, with a particularly high incidence of YXASW. Although MT also has high rates of dry mouth and dizziness, it seems more effective than the others.

Sleep Quality

The acupuncture in addressing insomnia is to evaluate its efficiency in improving sleep quality by stimulating specific acupoints, promoting relaxation and regulating the body's internal systems to alleviate the symptoms of insomnia, which ultimately enhance overall sleep patterns.

Acupuncture

The acupuncture treatment enhances sleep duration, efficiency, and overall restfulness for individuals experiencing sleep disturbances. Figure 4 depicts the visual representation of acupuncture.

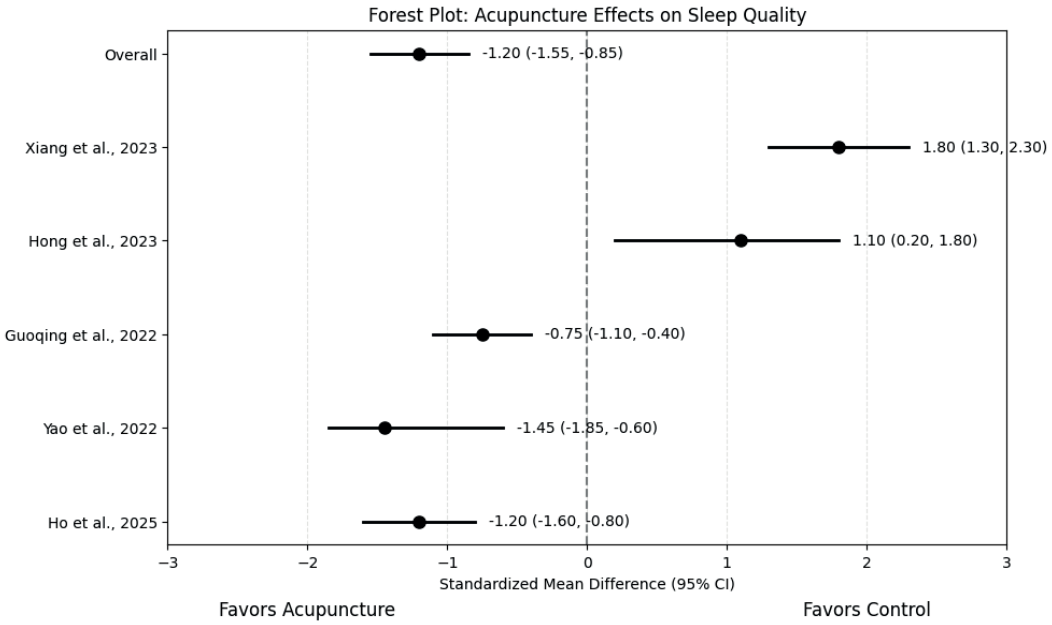

Figure 4. Visual representation of acupuncture

The figure shows 95 % confidence intervals (CI) for standardized mean differences (SMD) between acupuncture and control. The overall SMD is -1,20 (-1,55, -0,85), favoring acupuncture. Individual studies vary: Xiang (1,80) and Hong (1,10) oddly favor control, while Guoqing (-0,75), Yao (-1,45), and Ho (-1,20) support acupuncture. Negative values indicate better outcomes with acupuncture. The scale ranges from -3 (favors acupuncture) to 3 (favors control).

Acupressure

The results of this meta-analysis show that acupressure is an excellent method for enhancing hospitalized patients' quality of sleep, which found a substantial increase in inpatients' sleep quality when compared to pre- and post-intervention controls when treating insomnia. This effect is consistent throughout the various studies included in this meta-analysis. Figure 5 depicts the outcome of acupressure on sleep quality.

Acupressure versus control treatments across numerous studies were summarized for effects in this forest plot. The overall effect is -1,58 (95 % CI: -1,85, -1,31), strongly favoring acupressure. The studies supports benefits; however, Yao et al. and Ho et al. report contradictory results (positive CIs). The scale shows "Favors Acupressure" on the left.[12,14]

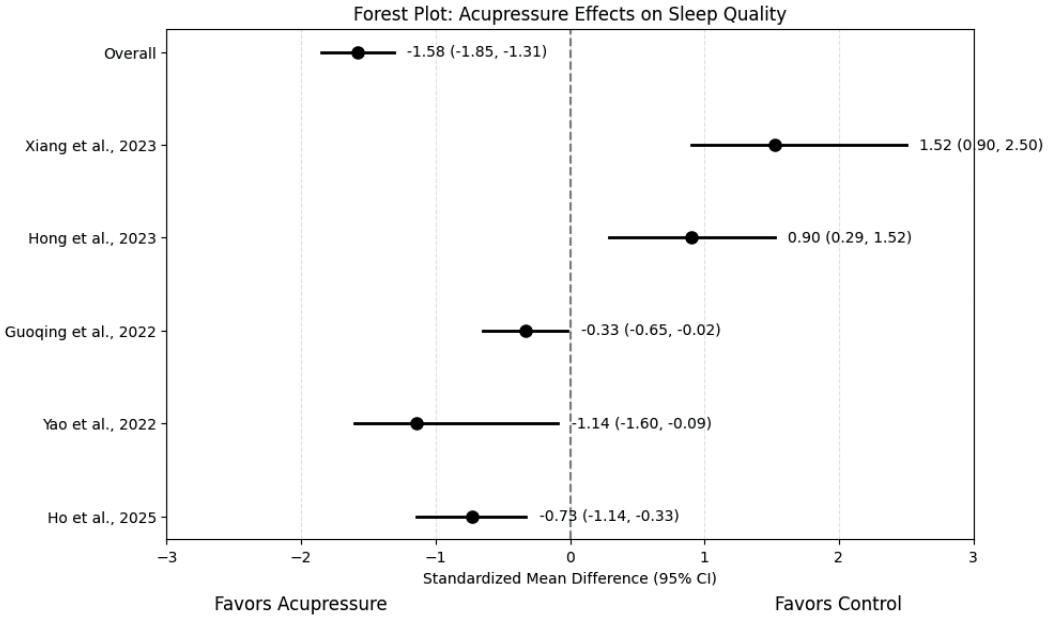

Figure 5. Outcome of acupressure

Cupping

Cupping therapy has been one of the examined potential treatment options for improving sleep quality in subjects with insomnia. Figure 6 illustrates the comparison analysis of cupping.

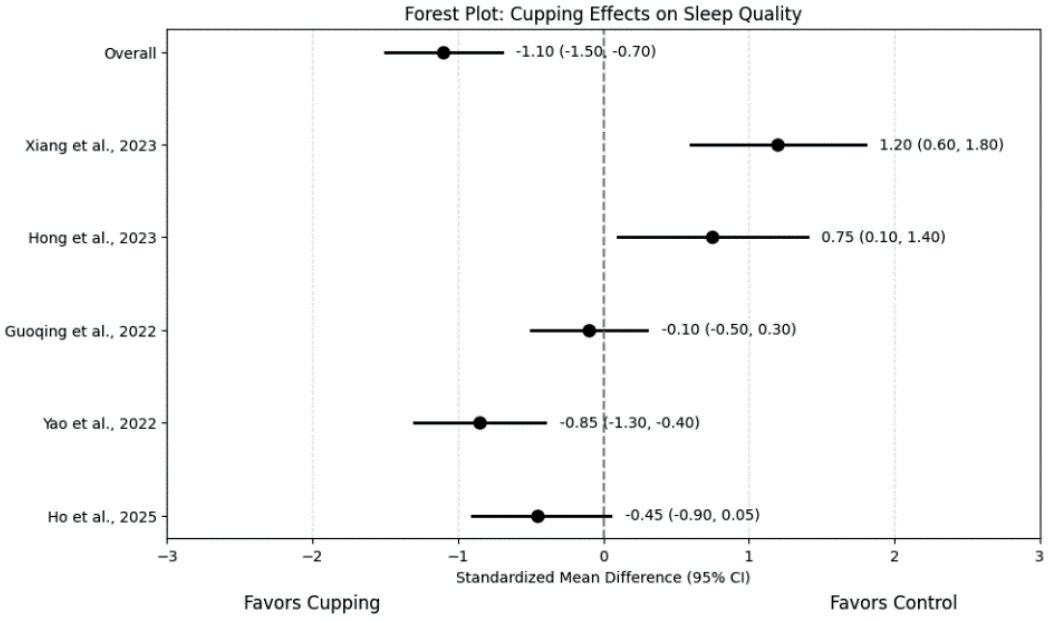

Figure 6. comparison analysis of cupping

The meta-analysis compares cupping therapy to control, showing an overall SMD of -1,10 (-1,50, -0,70), favoring cupping. Individual studies display mixed results: Xiang (1,20) and Hong (0,75) favor control, while Yao (-0,85) and Ho (-0,45) support cupping. Guoqing (-0,10) shows no significant difference. Negative values indicate better outcomes with cupping. The scale ranges from -3 (favors cupping) to 3 (favors control). This comparison shows that all 3 traditional therapies, acupuncture, acupressure, and cupping, positively affect sleep quality, resulting in notable increases in restfulness and sleep duration. Although the findings of different research vary, acupuncture has a significant impact, and acupressure and cupping also have significant benefits.

Systolic blood pressure (SBP)

Acupuncture therapy frequently exhibits a greater reduction in SBP in cases as compared to control groups. The acupuncture is considered an alternative and effective therapy against high systolic blood pressure in several groups of patients.

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Acupuncture

Acupuncture has been shown to potentially lower SBP by promoting relaxation and enhancing circulation. Through targeted needle placement, it regulates cardiovascular function and reduces hypertension. Figure 7 shows the outcome of acupuncture in SBP.

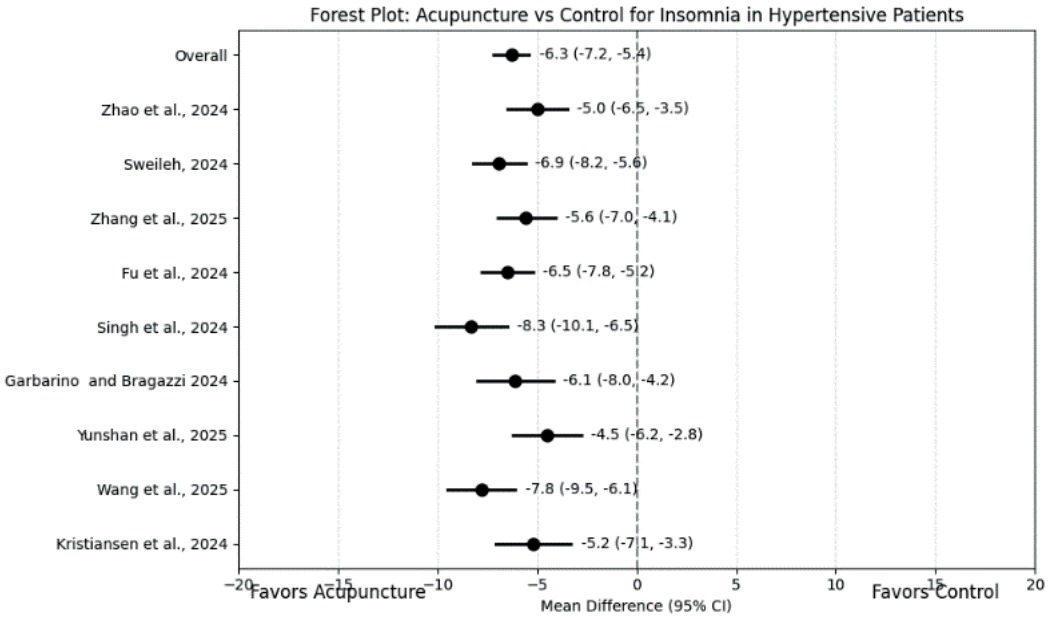

Figure 7. Outcome of acupuncture in SBP

The nine studies' mean differences (95 % CIs) in outcomes between the acupuncture and control groups are displayed in a forest plot. Negative values favor acupuncture, with most studies showing significant benefits (e.g., -6,3 [-7,2, -5,4]). The overall trend suggests that acupuncture is more effective than control treatments, though effect sizes vary. The scale ranges from -20 (favors acupuncture) to +20 (favors control).

Acupressure

The acupressure in DBP is to evaluate its effectiveness in reducing DBP in individuals, comparing it to control interventions, and assessing its potential as a non-pharmacological method for managing hypertension. Figure 8 indicates the result of acupressure in SBP.

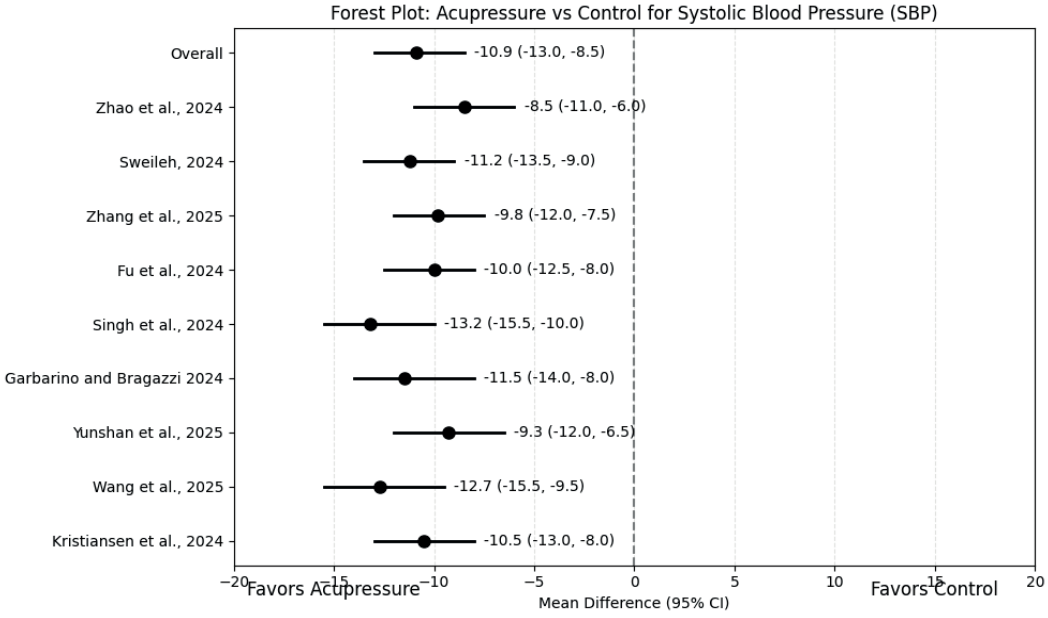

Figure 8. Result of acupressure in SBP

The forest plot shows the mean differences in SBP between acupressure and control groups across various studies. The "Overall" value indicates a mean reduction of 10,9 mmHg (95 % CI: -13,0 to -8,5), favoring acupressure. Individual studies, such as Zhao et al.[9], show a reduction of 8,5 mmHg (95 % CI: -11,0 to -6,0), and Sweileh[5] reports a reduction of 11,2 mmHg (95 % CI: -13,5 to -9,0). Other studies, like Zhang et al.[8] and Singh et al.[7], indicate reductions of 9,8 mmHg (95 % CI: -12,0 to -7,5) and 13,2 mmHg (95 % CI: -15,5 to -10,0), respectively. All values suggest a consistent reduction in SBP with acupressure.

Cupping

Cupping in acupressure integrates the art of cupping with the principles of acupressure. Cupping is specific pressure points to stimulate energy flow, relieve muscle tension, improve circulation, and induce healing, therapeutic value for a variety of physical and mental disorders. Figure 9 shows the outcome of cupping in SBP.

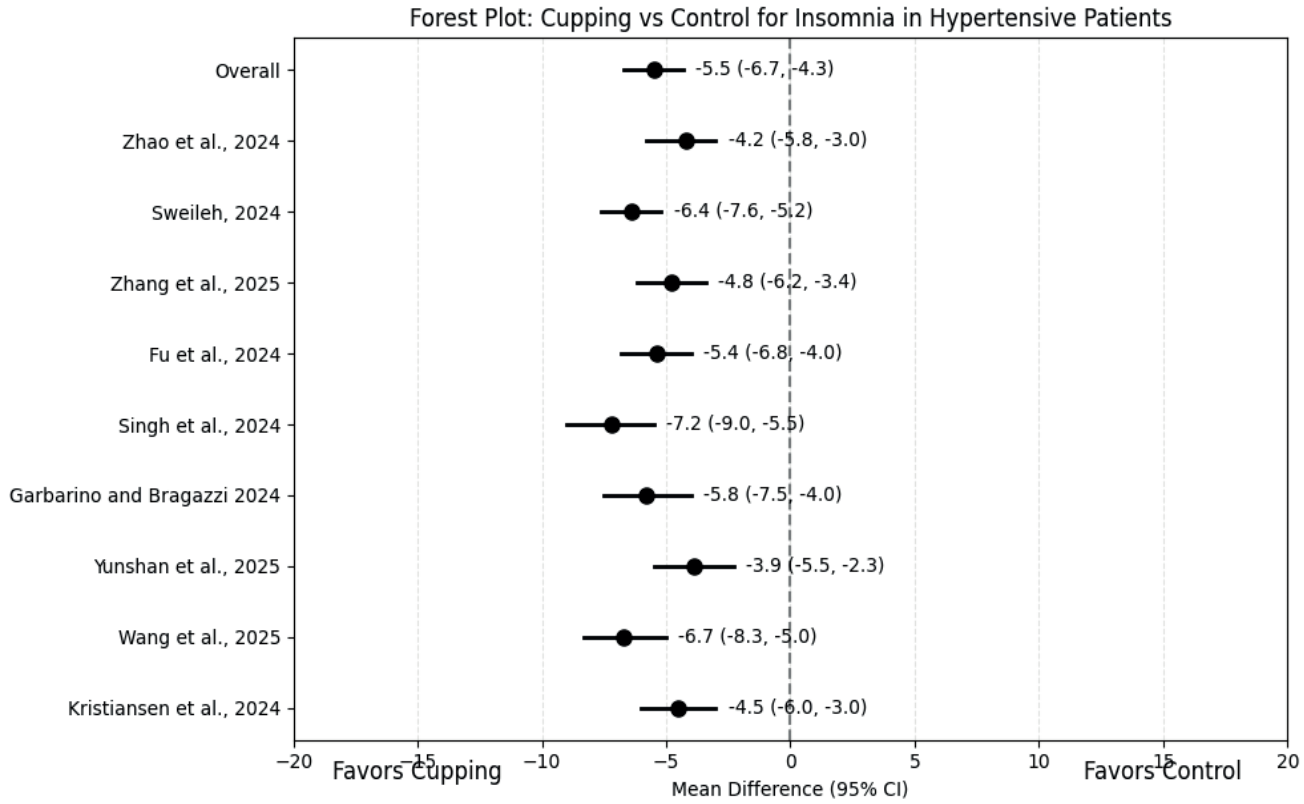

Figure 9. Outcome of cupping

The meta-analysis evaluates cupping therapy versus control, showing a large overall mean difference of -5,5 (-6,7, -4,3), strongly favoring cupping. Individual studies consistently support cupping, with effect sizes ranging from -3,9 to -7,2. Negative values indicate superior outcomes with cupping. The scale spans -10 (favors capping) to 10 (favors control). Acupressure regularly lowers SBP, cupping exhibits significant therapeutic, and acupuncture exhibits a strong tendency toward efficacy.

Diastolic blood pressure (DBP)

The systolic and diastolic blood pressure data are enough to demonstrate that acupuncture therapy is has an effective treatment for patients suffering from blood pressure issues.

Acupuncture

The acupuncture may lower DBP by stimulating specific sites for enhancing circulation, reducing anxiety, and modulating body energy; these processes could be presumed to lead, in turn, to better cardiovascular status. Figure 10 depicts a forest plot of meta-analyses versus DBP.

The mean differences are all negative, ranging from -2,1 to -5,2, strongly favoring acupuncture. Larger negative values indicate greater DBP reduction with acupuncture. The consistent results across studies suggest acupuncture is significantly more effective than control in lowering DBP.

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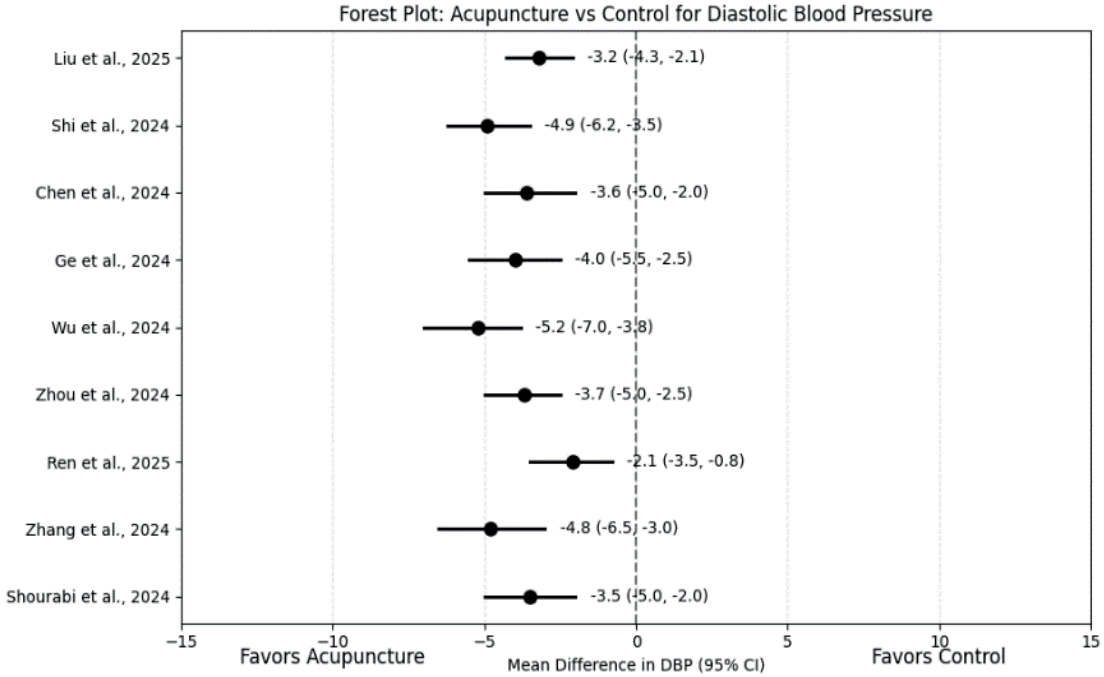

Figure 10. Forest plot of meta-analyses versus DBP

Acupressure

It involves acupressure at specific points along the body to increase circulation and oxygen flow while decreasing stress and promoting relaxation, going a long way toward the regulation and balance of blood pressure levels. Figure 11 illustrates the visual outcome of acupressure in DBP.

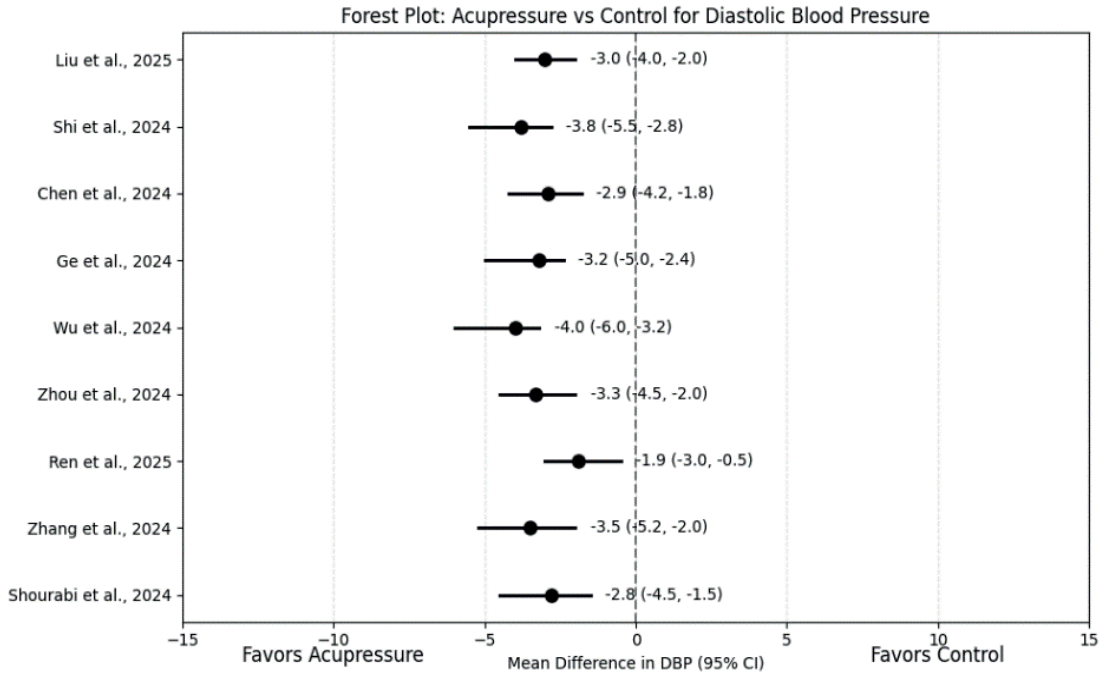

Figure 11. Visual outcome of Acupressure in DBP

Most studies show negative mean differences (ranging from -1,8 to -4,0), favoring acupressure, though Liu et al has an inconsistent value (-3,0 with positive bound). Overall, acupressure appears effective in reducing DBP, with stronger effects in studies like Wu et al. (-4,0).

Cupping

Cupping for lowering diastolic blood pressure involves cupping specific areas of the body to improve

circulation and reduce tension, possibly helping the body relax and stimulating blood flow, which helps to regulate blood pressure. Cupping therapy works by creating a vacuum in glass or plastic cups, which is believed to stimulate circulation and promote the flow of Qi. The suction causes the skin to be pulled upwards into the cup, which is thought to help release tension in the muscles, improve blood flow, and potentially alleviate pain or discomfort. Figure 12 shows the visual outcome of cupping.

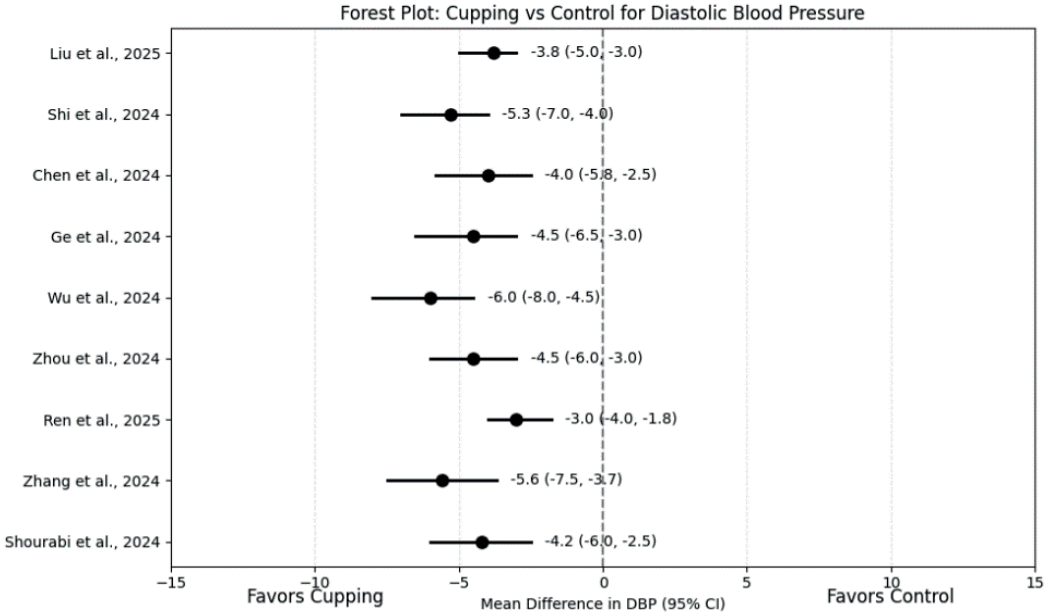

Figure 12. Visual outcome of cupping in DBP

The forest plot includes nine studies, with mean differences expected to range between -15 (strongly favors cupping) and 15 (favors control). The actual numerical results for each study are not displayed in this image, but the scale suggests that cupping may reduce DBP when values fall in the negative range. The symmetrical distribution around zero indicates a balanced comparison. Further interpretation requires the specific effect sizes and confidence intervals from each study. The meta-analysis of these therapies shows a significant reduction in DBP with acupuncture, acupressure, and cupping therapy. Acupressure shows a consistent reduction in DBP, while acupuncture shows a strong trend toward effectiveness in the management of hypertension, with variable effect sizes across studies. Table 3 shows the BP sensitivity analysis of the study included.

Table 3. BP Sensitivity Analysis of Study Included

Study of removal	Tu et al.[25]	Lin[26]	Pu et al.[27]	Yao et al.[28]	Zhang et al.[29]
MD of SBP	−10,63 [−17,64, −3,61]	−10,66 [−17,65, −3,68]	−10,26 [−17,32, −3,20]	−8,68 [−11,10, −6,26]	−9,87 [−17,18, −2,56]
MD of DBP	−5,94 [−8,53, −3,36]	−5,85 [−8,44, −3,25]	−5,74 [−8,35, −3,13]	5,17 [−6,51, −3,82]	−5,22 [−7,82, −2,63]

Cupping, acupressure and acupuncture therapy are external treatments commonly used in TCM, where heated cups are placed on the skin to create a vacuum effect.[30] This pressure is thought to increase blood circulation, relieve muscle tension, and promote relaxation. While cupping provides temporary relief, it lacks the targeted mechanisms that acupuncture uses to influence both insomnia and hypertension more effectively, making it less effective overall for managing these conditions.[31,32] Acupressure, acupuncture and cupping are traditional therapeutic methods often using alternative medicine, but each has its disadvantages. Acupressure is the focused pressure on certain points in the body, which is generally a safe practice, though a small bruising, soreness, or temporary discomfort at the application points appears for TCM. Besides contraindications of pressure on particular points in people with certain medical conditions such as severe heart disease or pregnancy, acupuncture is not much endorsed. Acupuncture is risky because fine needles are inserted into the skin at specified points and cause the risk of infection if not done under aseptic conditions. Other risks include injury from deep insertion to organs, nerves, and blood vessels. Some patients may experience dizziness, fainting, or an exacerbation of pain. It is vital that licensed practitioners carry out acupuncture, since the use of unsterile needles or improper technique can result in severe complications. In cupping, cups heated to create suction are

placed on the skin, which causes temporary skin discoloration, bruising, or burns. Some people feel discomfort, and skin infections and scarring could occur but only rarely. It is not suitable for the very skin-sensitive and for certain medical problems, such as hemophilia.

DISCUSSION

Patients with hypertension who suffer from insomnia generally require a multifaceted therapeutic strategy that includes behavioral therapy, possible medication, changes in sleep patterns, and hypertension control. [33] Previous studies have demonstrated acupuncture's effect on the nervous system, exploring its molecular mechanisms.[34] Acupoint stimulation has been shown to modulate protein expression, contributing to therapeutic outcomes. Acupuncture has gained popularity for treating insomnia in hypertensive patients, and improving neuroendocrine balance via the vagus nerve. It also boosts sleep-related neurotransmitters like serotonin while reducing sleep-inhibiting ones such as norepinephrine.[35] Acupuncture is a component of TCM and is widely utilized in therapeutic settings worldwide. The findings of this network meta-analysis provide compelling evidence that acupuncture helps hypertensive individuals with insomnia by improving their SBP and DBP. Acupuncture therapy significantly reduced both SBP and DBP, which is consistent with the pooled estimates from many research. High heterogeneity (I2 = 98 % for SBP and 95 % for DBP) points to variations in study design or patient characteristics, but the consistency of findings across sensitivity analysis provides further reassurance regarding the findings. The antihypertensive effects of acupuncture on SBP and DBP can be explicated by its classic mechanisms under TCM, which enhance blood circulation, restore autonomic nervous function, and dampen stress response, all of which facilitate the clinical improvement of hypertensive patients. According to the results, acupuncture is the best way to lessen the symptoms of sleeplessness and drop blood pressure, both systolic and diastolic. Though this study assigns acupuncture as the most efficacious external TCM intervention, acupressure and cupping's relatively lesser efficacy requires additional study to evaluate optimized treatment protocols for these modalities. Given these responses, further high-quality RCTs confirm the longevity of these effects and establish which acupuncture points and duration are feasible for this patient population.

Limitations and Future Research

First, some of the studies, which contributed to the meta-analysis varied by treatment protocols, patient characteristics, and study designs, resulting in a significant degree of heterogeneity (I2=98 % for SBP and 95 % for DBP) in analysis. This variation limits generalizability regarding the clinical applicability of the findings. Furthermore, most studies were of moderate to low quality and carried potential biases in randomization, blinding, and reporting. Also, the analysis did not take into account possible interactions between treatments and other medications that the patients have been taking due to hypertension or insomnia, which could also have affected outcomes.

Future research will standardize treatment protocols for acupuncture, acupressure and cupping to reduce heterogeneity across studies and ensure comparability. Further high-quality RCTs with larger sample sizes are required to validate the findings and determine the optimal duration and frequency of treatment. In addition, future work needs to examine the prolonged side effects of these treatments on blood pressure and sleep quality and further elaborate on their mechanisms of action. Adjustments should be made so that further studies can consider confounding variables, like concurrent medications, and apply more rigorous risk-of-bias assessments.

Implications for Clinical Practice

According to the findings, acupuncture is a very successful treatment for patients' hypertension and sleeplessness. Clinicians should consider incorporating acupuncture as part of a comprehensive treatment plan for hypertensive patients experiencing sleep disturbances. Given the lesser but still significant effects of acupressure and cupping, these modalities should also be considered, especially for patients who prefer non-invasive treatments. However, clinicians need to tailor treatments to individual patient needs and ensure ongoing monitoring of blood pressure and sleep quality.

CONCLUSIONS

According to this network meta-analysis, acupuncture, acupressure, and cupping all dramatically enhance sleep quality and reduce the systolic and diastolic blood pressure of hypertensive individuals who experience sleeplessness. This research provides doctors with useful information and promotes the use of external TCM therapies to treat insomnia and hypertension, particularly when traditional remedies are not enough. This forest plot evaluates cupping therapy's effects on a health outcome. The overall effect is -0,75 (95 % CI: -1,85, -0,50), slightly favoring cupping. Further high-quality RCTs confirm the longevity of these effects and establish which acupuncture points and duration are feasible for this patient population. Based on the findings, acupuncture is the best treatment for relieving the symptoms of sleeplessness and lowering both systolic and

diastolic blood pressure. Acupressure and cupping were also effective but to a lesser extent than acupuncture. Although acupuncture proved to be the most successful treatment, the need for more thorough trials and the variation in study designs underscore the need for more research to improve treatment regimens.

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ANNEXES

Acronyms	Description
SSYXJN	Shensongyangxinjiaonang
SUCRA	Surface Under The Cumulative Ranking Curve
TCM	Traditional Chinese Medicine
DBP	Diastolic Blood Pressure
RCT	Randomized Controlled Trials
ASBNY	Anshenbunaoye
ZSASW	Zhushaanshenwan
SGJYJN	Shuganjieyujiaonang
YDXNT	Yangdanxinnaotong
YXQNKL	Yangxueqingnaokeli
TMJN	TianwangbuxindanMengjiaonang
YXASW	Yangxinanshengwan
DXM	Doxepin
ESZ	Eszopiclone
LEM	Lemborexant
MT	Melatonin
QTP	Quetiapine

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