

Integrating traditional Chinese medicine into disease management in Singapore

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ABSTRACT

Introduction: While traditional Chinese medicine (TCM) has a long history and continues to be widely practised, its overall clinical efficacy according to conventional scientific standards remains the topic of ongoing research and exploration. This review focuses on the potential use of acupuncture and Chinese herbal medicine (CHM) in combination with Western medicine in Singapore, based on recently published data on the clinical effectiveness and cost-effectiveness of these TCM treatments.

Method: We collated and summarised 71 research papers published in the past decade, focusing on randomised controlled trials, systematic reviews and population-based cohort studies that had a total sample size (treatment and control arms) exceeding 60. English-language articles published between 2015 and 2025 were identified by searching PubMed/MEDLINE, the Cochrane Library and the China National Knowledge Infrastructure. The search strategy included intervention terms like "acupuncture", "Chinese medicine", "TCM", "traditional Chinese medicine", "RCT" and "randomized controlled trial"; economic evaluation terms like "cost" and "cost-effectiveness"; and disease conditions of concern. We narrowed our research to the clinical effectiveness and cost-effectiveness of CHM in which either the individual ingredients or the products were listed as Chinese Proprietary Medicines (CPMs).

Results: The summary tables demonstrate that the integration of acupuncture and/or CPMs with conventional Western medicine can enhance treatment outcomes across various chronic and non-chronic diseases. Their affordability and preventive focus can contribute to long-term healthcare cost savings, benefiting both patients and the healthcare system as a whole.

Conclusion: With a robust regulatory framework, scientific validation and government support, acupuncture and CPMs have an important role in the

management of various diseases, especially chronic ones, in Singapore.

Keywords: acupuncture, Chinese Proprietary Medicines, chronic diseases, clinical effectiveness, cost-effectiveness

CLINICAL IMPACT

What is New

- High-quality clinical trials and cohort studies demonstrate the efficacy and cost-effectiveness of traditional Chinese medicine treatments using acupuncture and Chinese Proprietary Medicines (CPMs) for chronic and non-chronic diseases in Singapore.

Clinical Implications

- Acupuncture can be a valuable stand-alone or adjunctive treatment that complements conventional treatments for managing chronic and non-chronic diseases, particularly for patients who experience adverse effects from medications or who seek non-pharmaceutical options.
- Integrating acupuncture and/or CPMs into Singapore's Chronic Disease Management Programme could provide a patient-centred approach, enhancing symptom management and potentially reducing the healthcare burden associated with chronic diseases.

INTRODUCTION

Traditional Chinese medicine (TCM) was introduced to the Singapore population by early Chinese

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immigrants from China.¹ During Singapore's colonial era, particularly between 1819 to 1959, Chinese medicine physicians offered their services as community service as well.¹ By employing a proactive strategy towards preventive care for health maintenance and providing efficacious remedies for illnesses for over 2 centuries, TCM has gained the trust and support of the public as complementary medical therapy.²

According to the 2022 National Population Health Survey, 8081 adults (aged 18–79 years) from 11,771 eligible households participated in the interviews.³ The survey also collected information on the timing of the most recent TCM visit, health conditions treated through either Western medicine or TCM (or both), the types of TCM prescriptions received and the primary reasons for seeking consultation. This information provided valuable insights into healthcare-seeking behaviours and the integration of different treatment approaches in the population. One in 5 adults reported using TCM within 1 year of the survey.² Of these, nearly 40% also used Western medicine for the same condition, suggesting that many view TCM as having an integral role in their illness and health.²

The importance of TCM in Singapore led to the enactment of the Traditional Chinese Medicine Practitioners Act in 2000, followed by the establishment of the Traditional Chinese Medicine Practitioners' Board to formally recognise, register and regulate TCM practitioners and acupuncturists.⁴ To enhance the role of TCM in Singapore, the Ministry of Health (MOH) established the Traditional Chinese Medicine Research Grant (TCMRG) in 2014, to encourage collaborative research between Singapore's public health and TCM institutions. The goal is to harness TCM principles together with scientific research methodologies and expertise to promote the integration of TCM into Western medicine practice, so as to provide better healthcare and achieve improved health outcomes in a sustainable manner.⁵ The 6th TCMRG Grant Call was open from 8 January 2025 to 31 March 2025.

Management of chronic diseases (CDs) in Singapore

The increasing prevalence of coexisting 2 or more CDs in individuals (i.e. multimorbidity) is a major public health concern. According to a retrospective cohort study of 254,377 patients, the prevalence of multimorbidity was 62.4%, which led to significant healthcare costs.⁶ Another study in Singapore on the healthcare and societal cost of multimorbidity among elderly residents found that the prevalence of multimorbidity was significantly associated with age.⁷ The healthcare cost burden is associated with the prevalence of multimorbidity.⁶ In Singapore, the healthcare expenditure increased from SGD3.8

billion in 2010 to SGD11.1 billion in 2019, and is expected to rise to SGD27 billion by 2030, excluding the impact of COVID-19.⁸

This high rate of multimorbidity not only correlates with the utilisation of healthcare resources but also highlights the urgent need for effective management strategies to alleviate its impact on the healthcare system. Consequently, the national initiative Healthier SG was implemented in July 2023.⁹ The main objective of this programme is to nurture an ecosystem that promotes better health by leveraging the primary healthcare system and collaborating with community partners.¹⁰ As of February 2024, the Healthier SG Chronic Tier subsidy framework includes subsidised pricing comparable to polyclinics for selected chronic medications at Healthier SG General Practitioner clinics to enhance affordability for enrolled residents.¹¹ There are currently 23 chronic diseases in the Chronic Disease Management Programme (CDMP) that are generally progressive, require long-term care, and have their medications covered and subsidised under the Singapore Community Health Assist Scheme (CHAS). They are: (1) chronic conditions that require submission of clinical data to assess the effectiveness of disease management: diabetes mellitus and pre-diabetes, hypertension, lipid disorders, asthma, chronic obstructive pulmonary disease and chronic kidney disease (nephritis/nephrosis); (2) mental illnesses: anxiety disorders, major depressive disorder, bipolar disorder and schizophrenia; (3) other chronic conditions including stroke, major neurocognitive disorder (dementia), osteoarthritis, Parkinson's disease, benign prostatic hyperplasia, epilepsy, osteoporosis, psoriasis, rheumatoid arthritis, ischaemic heart disease, allergic rhinitis, gout and chronic hepatitis B.¹²

In 2020, MOH initiated a pilot study to extend subsidy and MediSave coverage for acupuncture treatments of neck pain and lower backache in public healthcare institutions (PHIs).¹³ Following formal diagnosis and referral by the treating medical specialist at a PHI, patients aged 18 years and older can receive acupuncture, including electroacupuncture for these 2 conditions.¹⁴

In January 2025, MOH encouraged PHIs to engage in a regulatory sandbox effort focused on the combination of Western medicine and TCM in the treatment of CDs, using acupuncture and/or Chinese Proprietary Medicines (CPMs), for a designated duration. The MOH's vision includes creating "TCM Integrative sandboxes" within PHIs.² The sandbox initiative allows the execution of evidence-based TCM treatments alongside standard healthcare practices under controlled procedures with the goals of enhancing treatment outcomes while managing potential risks. The initiative also includes the rigorous cost-effectiveness evaluation of the applied TCM treatments.²

Acupuncture

Acupuncture is one of the primary therapeutic approaches within the framework of TCM, which involves the insertion of fine needles into specific acupoints. The underlying treatment mechanisms can be explained through both TCM theory and insights from modern biomedical research.¹⁵

While acupuncture's clinical application covers a broad range of diseases, its multi-targeted treatment effects are significantly beneficial in addressing the growing burden of multimorbidity in Singapore. The non-pharmaceutical nature of acupuncture provides an alternative for patients who did not achieve desired outcomes from drug treatments or experienced adverse effects from medications. Additionally, acupuncture holds promise in alleviating CD symptoms, which can fit within the integrated patient-centred care setting.

Chinese herbal medicine (CHM)

CHMs are classified into raw CHMs and CPMs.¹⁶ Due to the low toxicity of most raw herbs and the existing regulation of herbs with hazardous chemicals already regulated under the Poisons Act, the Health Sciences Authority (HSA) applies light-touch controls to the import, export, sale and distribution of raw herbal medicines.¹⁶ The supplier must comply with the regulatory requirements to ensure the absence of prohibited ingredients and potent medicinal substances; labelling requirements; and limits on heavy metal content. HSA will perform ad hoc testing when severe adverse events are reported.

According to the Medicines Act of Singapore, CPMs are defined as finished products (capsules, tablets, pills, mixtures, powders, etc.) that contain raw Chinese medicinal materials used in TCM practice. Injections and products containing any chemically defined isolated constituents as an active ingredient are excluded.¹⁷ The regulation was initiated in 1999 to promote safety and quality of CPMs and remove substandard, fake imitation and adulterated products. This includes establishing and identifying ingredients that should be prohibited; setting limits for naturally occurring substances, toxic heavy metals and microbial limits; establishing requirements in labelling; avoiding transmissible spongiform encephalopathy in animal-derived ingredients; prohibiting substances from endangered species; and setting standards for advertisements and promotions. The regulatory control for CPMs is tighter than that of health supplements but less stringent than for pharmaceuticals. As of July 2025, there are 13,687 CPMs listed as compared with 7943 listings in 2001. However, not all the listed CPMs are marketed.

Review of the clinical effectiveness and cost-effectiveness of acupuncture and CPMs in the management of chronic and non-chronic diseases

The clinical effectiveness of TCM has been a subject of interest in both TCM and modern medicine research. The body of clinical research on acupuncture and CHMs for CD management has expanded considerably over the past 2 decades.

This review focuses on the utilisation of acupuncture and CPMs in Singapore and aims to comprehend their clinical effectiveness and cost-effectiveness as evidenced by clinical studies. We analysed research papers according to the following inclusion criteria: (1) published within the last decade, with a focus on randomised controlled trials (RCTs), systematic reviews and population-based cohort studies involving sample sizes larger than 60 participants; and (2) either the individual ingredients or the products were listed as CPMs (excluding decoctions) in Singapore. To broaden the application of acupuncture and CPMs, our review included studies on 38 diseases both covered and not covered under the CDMP (Table 1). This comprehensive approach enables an evidence-based evaluation to guide and prioritise current potential projects of the MOH's TCM Integrative Sandbox initiative.

A literature search was conducted in PubMed/MEDLINE, Cochrane Library and China National Knowledge Infrastructure (CNKI) for English-language articles published from 2015 to 2025. The search strategy incorporated the following keywords and their combinations including (1) intervention terms such as "acupuncture", "Chinese medicine", "TCM", "traditional Chinese medicine", "RCT" and "randomized controlled trial"; (2) economic evaluation terms including "cost" and "cost-effectiveness"; (3) condition and disease of interest terms including specific standardised names such as "hypertension", "diabetes mellitus", "neoplasia", "cerebrovascular accident", etc.

Supplementary Table S1 provides a comprehensive summary of 71 clinical studies (48 on acupuncture and 23 on CPMs) that demonstrated favourable clinical outcomes in managing the chronic and non-chronic diseases (CNCD) through acupuncture and CPMs. The application of acupuncture and/or CPMs in the management of 38 CNCD offer significant clinical effectiveness ($P < 0.05$).

Supplementary Table S2 shows 4 studies that examined the cost-effectiveness of CPMs relative to conventional medicine or placebo in the management of hypertension, heart failure, knee osteoarthritis and chronic obstructive pulmonary disease. Another study assessed the cost-effectiveness of acupuncture for migraine. These studies demonstrated that

Table 1. Chronic and non-chronic diseases recommended for acupuncture and/or Chinese Proprietary Medicines in the studies reviewed.

Type of disorder	Chronic and non-chronic diseases (CNCD)	Clinical effectiveness studies		Cost-effectiveness studies	
		ACU	CPM	ACU	CPM
Circulatory disorder	Hypertension (CNCD1) ^a	2	1		1
	Ischaemic heart disease (CNCD2) ^a	1	1		1
Dermatological disorder	Atopic dermatitis (CNCD3)	1			
	Chronic spontaneous urticaria (CNCD4)	1			
Endocrine/metabolic disorder	Diabetes mellitus/pre-diabetes (CNCD5) ^a	1	2		
	Hyperlipidaemia (lipid disorders) (CNCD6) ^a		1		
	Obesity/overweight (CNCD7)	2	1		
Gastrointestinal disorder	Functional constipation (CNCD8)	2			
	Functional dyspepsia (CNCD9)	1			
	Irritable bowel syndrome (CNCD10)	2			
Genitourinary disorder	Benign prostatic hyperplasia (CNCD11) ^a	1	1		
	Chronic kidney disease (nephrosis/nephritis) (CNCD12) ^a		1		
	Chronic pelvic pain syndrome (CNCD13)	1			
	Stress urinary incontinence (CNCD14)	1			
Hepatic disorder	Chronic hepatitis B (CNCD15) ^a		1		
Nervous system disorder	Bell's palsy (CNCD16)	2			
	Dementia (CNCD17) ^a	2	1		
	Epilepsy (CNCD18) ^a	2			
	Migraines (CNCD19)	2		1	
	Parkinson's disease (CNCD20) ^a		1		
	Stroke (CNCD21) ^a	4	2		
	Trigeminal/post-herpetic neuralgia (CNCD22)	1			
Musculoskeletal disorder	Chronic lower back pain (CNCD23)	1			
	Chronic neck pain (CNCD24)	1			
	Gout (CNCD25) ^a		1		
	Osteoarthritis (CNCD26) ^a	2	2		1
	Rheumatoid arthritis (CNCD27) ^a	1	1		
Respiratory disorder	Allergic rhinitis (CNCD28) ^a	1			
	Asthma (CNCD29) ^a	1	1		
	Chronic obstructive pulmonary disease (CNCD30) ^a		1		1
Reproductive health disorder	Infertility (CNCD31)	1			
	Uterine fibroid (CNCD32)	1			
Oncological disorder	Cancer (CNCD33)	4	1		

Table 1. Chronic and non-chronic diseases recommended for acupuncture and/or Chinese Proprietary Medicines in the studies reviewed. (Cont'd)

Type of disorder	Chronic and non-chronic diseases (CNCD)	Clinical effectiveness studies		Cost-effectiveness studies	
		ACU	CPM	ACU	CPM
Ophthalmological disorder	Dry eye (CNCD34)	1			
Psychiatric disorders	Anxiety (CNCD35) ^a	1	1		
	Insomnia (CNCD36)	2			
	Major depression (CNCD37) ^a	1	1		
	Schizophrenia (CNCD38) ^a	1	1		
Total studies		48	23	1	4

ACU: acupuncture; CNCD: chronic and non-chronic diseases; CPMs: Chinese Proprietary Medicines

^a Included in the Chronic Disease Management Programme (CDMP) in Singapore.

Psoriasis, osteoporosis and bipolar disease in the CDMP were not included in the analysis due to a lack of suitable studies based on the study's eligibility criteria.

acupuncture and/or CPMs, alone or in combination with Western medicines, could potentially reduce healthcare costs by improving outcomes, decreasing hospitalisation rates or duration, and lowering re-admissions.

Limitation of this review

This review highlights key findings on the role of acupuncture and CPMs in the management of CNCD. However, several limitations should be noted. First, while the included studies suggest potential clinical benefits and cost-effectiveness of acupuncture and CPMs in CNCD management, extensive local epidemiological data and cost-effectiveness analyses, including TCM usage associated with lower medication burden or reduced hospital admission are lacking. The evidence was obtained mainly from studies (69 out of 71) conducted outside Singapore, and the findings may have limited direct applicability to other non-Chinese populations (Malays, Indians and other ethnic groups) due to potential genetic, dietary, constitutional and lifestyle differences. Genetic variations, such as polymorphisms in drug-metabolising enzymes, could influence treatment responses and outcomes. For instance, the frequency of the A2455G polymorphism variant of *CYP1A1* in Singapore was 31% in Malays, 28% in Chinese and 18% in Indians.¹⁸ Moreover, a local study reported that “damp heat”, “phlegm-dampness” and “qi deficiency” were the most prevalent among the diverse population in Singapore.¹⁹ In contrast, balanced “yang deficiency” and “qi deficiency” constitutions were the most prevalent within the general population in China.²⁰ Therefore, caution should be exercised when generalising the TCM efficacy results to ethnically distinct populations from different geographies, which warrants further in-depth studies in multiracial Singaporean cohorts.

In addition, several systematic reviews and meta-analyses of RCTs have indicated that the majority of the studies used CHM decoctions rather than CPMs in the intervention. In this study, we excluded RCTs and population-based cohort studies using CHM decoctions, as well as non-English articles. To ensure that most internationally published CNCD studies could be included, we included multicentre cohort studies and non-double-blind studies. Consequently, to our knowledge and review criteria, clinical studies of the 3 chronic diseases—psoriasis, osteoporosis and bipolar disorder—could not be included in Supplementary Table S1 due to a lack of suitable studies based on our eligibility criteria.

To our knowledge, this is the first Singapore study that has comprehensively searched, reviewed and evaluated articles on TCM clinical efficacy and cost-effectiveness in the management of CNCD using focused inclusion and exclusion criteria. The articles included in the review carry risks of bias and a lack of higher levels of evidence, for example, the inclusion of 5 single-blind clinical studies. While this analysis includes data from systematic reviews, meta-analyses and RCTs, it is important to recognise that methodological limitations exist in many TCM trials. For instance, a study evaluating the risk of bias in 4175 RCTs revealed that significant concerns persist about allocation concealment and blinding despite demonstrated improvements concerning uncertain risk regarding random sequence generation and selective reporting.²¹ Some of the included systematic reviews of acupuncture studies also reported the inclusion of studies that did not follow standard tools, such as Cochrane's risk-of-bias tool, resulting in lower methodological quality, a higher possibility of publication bias and low-certainty evidence.

Nevertheless, most of the articles included that involved RCTs have relatively large sample sizes, ranging from a hundred to several thousands. For studies involving population-based cohort designs, sample sizes were large, ranging from thousands to tens of thousands, and were conducted nationwide or in multiple centres. The majority of studies were conducted in China and Taiwan; hence, it is essential for more TCM studies to be conducted in localised regions in Southeast Asia so that the findings can be better applied to Singapore. Clinical heterogeneity may be present due to the diversity in conventional TCM treatments and their varying courses. The key sources of heterogeneity are: (1) acupuncture techniques including manual manipulation and electroacupuncture, and stimulation intensity; (2) selection of acupoints such as standardised versus (vs) individualised protocols, and varied philosophies; (3) treatment duration, intervals, frequency and practitioner experience; (4) CPMs' variability including formulation differences, for example, fixed doses in research studies vs individualised regimens in clinical practice. Future Singapore-tailored research could include large, pragmatic multicentre trials to assess real-world clinical effectiveness and cost-effectiveness, as well as ethnically stratified analyses to determine the differential responses among Chinese, Malay, Indian and other populations within the integrative care model.

While TCM modalities are relatively safe when properly administered, adverse events have been reported. For instance, a meta-analysis of 11 acupuncture studies including 845,637 participants reported that the overall risk of at least 1 adverse event was approximately 9.31 per 100 patients treated.²² Mild and transient adverse events, including local bleeding, pain or flare around needling site may be regarded as part of the acupuncture treatment or therapeutically intended reactions.²² Severe adverse events, such as pneumothorax, significant cardiovascular or syncope, and fall or trauma are rare; they occur in 1 to 3 cases out of 1 million treatments.²² A Singapore survey of 1028 participants indicated that patients who ingested CHM and Western prescription medicines were 3.65 times more likely to encounter an adverse event compared with those who took CHM alone.²³ Among 18 adverse event reports adjudicated for patients who consumed CHM and Western prescription medicines concurrently, gastrointestinal discomfort, such as churning, mild pain, diarrhoea, nausea, fatigue and skin rash were recorded.²³ The primary safety issue with CPMs is the potential drug-herb interaction (DHI), which could be mitigated by encouraging disclosure of CPM and Western prescription medicines during patients' medication reconciliation, and establishing

evidence-based interaction databases and DHI knowledge sharing among both conventional and TCM healthcare providers.

Despite the shortcomings, this is the first compilation of articles with extensive evidence-based TCM clinical efficacy and cost-effectiveness results, which may provide a relevant basis for the integration of conventional medicine with acupuncture and/or CPMs in the treatment of CNCD of interest in Singapore.

We hope this review will guide policymaking and the development of strategies for integrating acupuncture and/or CPMs into CNCD management as a new model of care moving forward. Many feasible options can be explored and pursued, including: (1) structured cross-referral system that allows formalised, transparent referral pathways between physicians and accredited TCM providers, ensuring patient safety via shared records and avoiding unintentional duplication of therapies; (2) introduction of evidence-based TCM modalities in hospital care to shorten recovery times, improve symptom control and reduce length of stay of inpatients; (3) expansion of cross-disciplinary education, such as through a TCM practitioners-pharmacists partnership for the joint development of a DHI database and review of reported cases of adverse events resulting from DHI; (4) co-location of clinics that enable accredited TCM practitioners to provide coordinated care with conventional healthcare clinicians in polyclinics or specialised outpatient facilities.

CONCLUSION

In providing holistic and patient-centric care, acupuncture and CPMs may effectively manage symptoms and control the underlying complications of CNCD. Its integration with conventional medicine can enhance treatment outcomes, while its affordability and preventive focus can contribute to long-term healthcare cost savings, benefiting both patients and the healthcare system as a whole. With a robust regulatory framework, scientific validation and government support, acupuncture and CPMs have an important role in CNCD management in Singapore.

While acupuncture and CPMs offer potential scientifically efficacious and cost-saving benefits, such as complementing conventional medicine to lower healthcare costs and reduce the occurrence of adverse events, challenges such as quality control and the continuous need for high-quality research to validate these conclusions remain.

Addressing these challenges is crucial to maximising the potential and inclusion of acupuncture and CPMs in Singapore's integrated CNCD healthcare management system.

Supplementary materials (available online)

Table S1. Clinical effectiveness of acupuncture and/or Chinese Proprietary Medicines registered in Singapore in the management of chronic and non-chronic diseases.

Table S2. Cost-effectiveness of acupuncture and Chinese Proprietary Medicines registered in Singapore in the management of chronic and non-chronic diseases.

Ethics statement

Not applicable as this is a systematic review and meta-analysis of literature.

Declaration

The authors declare that they have no affiliations or financial involvement with any commercial organisation with a direct financial interest in the subject or materials discussed in the manuscript. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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