PROTOCOL

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Efficacy and Safety of East Asian Herbal Medicine for Delayed Encephalopathy after Acute Carbon Monoxide Poisoning: A Protocol for Systematic Review and Meta-Analysis

Eun-Young Ju, Byung-Jin Kim*, Sang-Ho Kim*

Departments of Internal Korean Medicine, *Neuropsychiatry of Korean Medicine, Pohang Korean Medicine Hospital Affiliated to Daegu Haany University

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Correspondence to
Sang-Ho Kim
Department of Neuropsychiatry of Korean Medicine, Pohang Korean Medicine Hospital Affiliated to Daegu Haany University, 411 Saecheonnyeon-daero, Nam-gu, Pohang, Korea.
Tel: +82-54-281-0055
Fax: +82-54-281-7464
E-mail: omed22@naver.com

Objectives: Delayed encephalopathy after acute carbon monoxide poisoning (DEACMP) is a neurological complication that can occur following a pseudo-recovery phase after acute carbon monoxide poisoning (ACMP). Current treatments, such as Hyperbaric Oxygen (HBO) therapy and various pharmacological agents for DEACMP, have shown limited effectiveness. Given the reported benefits of East Asian herbal medicine (EAHM) in managing cerebral ischemia through antioxidant, anti-inflammatory, and anti-apoptotic mechanisms, EAHM may offer therapeutic potential for DEACMP. However, no systematic reviews of the clinical reports on this topic have been conducted thus far. This review aims to analyze the efficacy and safety of EAHM in patients with DEACMP.
Methods: We will search eleven electronic databases and review randomized controlled trials of EAHM in patients with DEACMP.
Results: The primary outcomes will include scores from the Mini-Mental State Examination and the Montreal Cognitive Assessment. The Cochrane risk-of-bias tool will be used for quality assessment. A meta-analysis will be conducted to evaluate the efficacy and safety of EAHM in this patient population.
Conclusions: This review will provide clinical evidence regarding the efficacy and safety of EAHM for patients with DEACMP. The findings will be beneficial for clinicians and researchers involved in the care of these patients and will inform the design of future clinical studies.

Key Words: Delayed encephalopathy, Carbon monoxide poisoning, Drugs, Chinese herbal, Meta-analysis, Systematic review.

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I. INTRODUCTION

Carbon monoxide (CO) is a tasteless, odorless, and colorless gas that exerts its toxic effects by forming carboxyhemoglobin upon inhalation, leading to hypoxic-ischemic cellular injury[1]. Globally, the cumulative incidence and mortality rate of CO poisoning are estimated to be 137 cases and 4.6 deaths per million population, respectively[2]. Historically, acute CO poisoning (ACMP) has been linked to improper use of heating devices and exposure to the gas. However, the incidence of ACMP cases resulting from suicide attempts has demonstrated an upward trend[3,4]. Internationally, the inhalation of gases accounts for 5~15% of suicides, with CO being the most frequently inhaled gas[5].

CO exhibits a 200- to 250-fold greater affinity for hemoglobin than that noted with oxygen, thus interfering with the oxygen supply and inhibiting cytochrome oxidase in mitochondria, leading to tissue hypoxia[6,7]. In ACMP, the central nervous system sustains significant damage, with the risk of neurological sequelae, including cognitive dysfunction, psychiatric issues, vestibular dysfunction, and motor impairment, ranging from 10% to 30%[8]. The hippocampus, basal ganglia, and cerebral cortex, regions particularly susceptible to ischemia and oxidative stress, are among the areas primarily affected[9,10]. Delayed encephalopathy after acute carbon monoxide poisoning (DEACMP) is a neurological complication that occurs in 10~20% of patients with ACMP following a pseudo-recovery period lasting from 10 to 40 days[11]. Moreover, DEACMP causes memory loss, behavioral and mood disorders, mild cognitive impairment, severe dementia, vision loss, psychosis, and extrapyramidal symptoms, all of which severely diminish quality of life[12]. The diagnosis of DEACMP involves a history of CO exposure, the presence of a lucid interval lasting approximately two days to two months (with an average duration of 22 days)[13], and the identification of brain lesions through computed tomography or magnetic resonance imaging (MRI)[14]. The prognosis of DEACMP is generally poor and prolonged, with severe cases potentially being fatal[8,15,16].

The mechanisms underlying DEACMP remain unclear, which is why symptomatic treatment is typically selected, with hyperbaric oxygen (HBO) therapy being the most common[17,18]. However, the efficacy of HBO for DEACMP in the chronic phase of CO exposure remains unclear, and adverse effects such as severe fatigue, memory loss, and reduced concentration have been reported following two or more HBO sessions[18]. In addition, pulmonary edema, seizures, and increased free radical production may occur during HBO therapy[19]. Pharmacological interventions for DEACMP include N-butylphthalide (NBP) and dexamethasone in combination with mesenchymal stem cell transplantation, HBO, oxiracetam injections, and others[20-24]. However, the evidence supporting these pharmacological treatments remains inconclusive, and existing randomized controlled trials (RCTs) are limited by various methodological constraints[20-24]. Additionally, NBP has been reported to cause adverse effects, including nausea, vomiting, liver function impairment, insomnia, dizziness, and fatigue[25]. Dexamethasone is associated with a spectrum of side effects, ranging from common symptoms, such as insomnia, gastrointestinal discomfort, fluid retention, mood changes, to serious complications, including adrenal suppression, cardiac arrhythmias, electrolyte disturbances, and increased intracranial pressure[26].

Cerebral ischemia arises through multiple pathways; consequently, effective neuroprotective therapies must target the diverse underlying pathological mechanisms[27]. Unlike pharmacological treatments, East Asian herbal medicine (EAHM) is composed of diverse bioactive compounds and thus offers syner-

gistic effects through various pathological mechanisms[28]. Preclinical studies have shown that EAHM monomers promote neurological recovery after cerebral ischemia–reperfusion injury by alleviating oxidative stress, inhibiting inflammation, preventing neuronal loss and dysfunction, and reducing the size of cerebral infarcts[29]. Furthermore, EAHM is utilized to manage stroke and exerts therapeutic effects via multiple mechanisms, including suppression of ischemia-induced inflammation, scavenging of free radicals, inhibition of neuronal apoptosis, and regulation of blood lipid levels[30-32]. Notably, the EAHM exerts multi-targeted effects on numerous apoptotic pathways, including modulation of the mitochondrial, death receptor, and endoplasmic reticulum-mediated apoptotic pathways[33]. Moreover, the EAHM has demonstrated efficacy and safety in patients with stroke when administered either as a monotherapy or in combination with conventional Western medicine[34-36]. In Korea, clinical practice guidelines have been developed that recommend EAHM for treating patients with stroke and vascular dementia[37,38].

Despite the possibility of EAHM addressing DEACMP, only one meta-analysis indicated that Buyanghuanwu-tang (Boyanghwanoh-tang) may be effective for the condition. A recent review summarizes RCTs evaluating the use of EAHM in patients with DEACMP over the past eight years[39,40]. However, to date, no comprehensive systematic review has provided evidence regarding the use of EAHM in the treatment of patients with DEACMP. Therefore, this review will aim to analyze the efficacy and safety of EAHM in patients with DEACMP.

II. METHODS AND ANALYSIS

1. Protocol and registration

This systematic review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement for meta-analyses[41]. This protocol will adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses-P (PRISMA-P) guidelines for systematic review protocols (Supplementary 1)[42]. This protocol was registered with PROSPERO on April 8, 2025, and the registration number is CRD420251028249.

2. Eligibility criteria

1) Types of studies

This review will include RCTs, pilot, and feasibility studies, as well as study designs, and exclude case reports, cross-sectional studies, reviews, and mechanistic or animal experimental studies. Academic theses, dissertations, and conference proceedings will also be excluded.

2) Type of participants

This review will include adults aged ≥18 years who were diagnosed with DEACMP. Studies that enrolled patients with CO poisoning diagnosed according to the corresponding clinical guideline criteria, MRI, or computed tomography will be included. Only studies that used certain diagnostic criteria for depression, such as the Diagnostic and Statistical Manual of Mental Disorders, International Classification of Diseases, Chinese Classification of Mental Disorders, Standard of Traditional Chinese Medicine Diagnosis and Treatment Effect, and Guiding Principles for Clinical Research on New Drugs of Traditional Chinese Medicine, will be included. Studies using clinical symptoms, including apathy, dementia, disorientation, ataxia, amnesia, psychiatric symptoms, extrapyramidal symptoms, pyramidal symptoms, tremors, paralysis, increased muscle tone, memory loss, and dullness, as diagnostic criteria will also be included, along with those using electroence-

phalography (EEG), Mini-Mental State Examination, and Montreal Cognitive Assessment as diagnostic criteria. However, patients with pre-existing psychiatric illnesses before CO poisoning will be excluded. Studies that do not provide diagnostic criteria or utilize validated assessment tools will be excluded from this review. No restrictions will be placed on the participants' sex or race.

3) Types of intervention

This review will include studies using EAHM alone or in combination with routine care for DEACMP, including HBO, neurotrophic agents, cerebral cell activators, circulation enhancers, anticoagulants, and anti-inflammatory agents. Additionally, studies involving the use of other pharmacological treatments for comorbid conditions will be included. Furthermore, those utilizing EAHM in various forms, such as decoctions, injections, capsules, granules, and powders, will also be considered. Studies using EAHM combined with acupuncture-related therapies (acupuncture, acupressure, moxibustion), herbal bathing, and other treatments will be excluded.

4) Type of comparator(s)/control(s)

Studies using HBO, neurotrophic agents, cerebral cell activators, circulation enhancers, anticoagulants, and anti-inflammatory agents will be included.

3. Types of outcome measures

1) Primary outcomes

The primary evaluation tools for evaluating changes in the severity of DEACMP will be the Mini-Mental State Examination and the Montreal Cognitive Assessment.

2) Secondary outcomes

Secondary outcomes will be the total effective rate, changes observed in MRI, EEG, and blood biomarkers such as high-sensitivity C-reactive protein, interleukin-6, neuron-specific enolase, and S100 beta protein. In addition, safety will be evaluated based on reported adverse events.

3) Measures of effect

Relative risk (RR) will be used for dichotomous variables, while mean difference (MD) or standardized mean difference (SMD) with a 95% confidence interval (CI) will be utilized for continuous variables.

4. Search methods for identification of studies

Eleven electronic databases, including PubMed, Embase via Elsevier, the Cochrane Central Register of Controlled Trials, Web of Science, SCOPUS via Elsevier, Allied and Complementary Medicine Database via EBSCO, PsycARTICLES via ProQuest, Oriental Medicine Advanced Searching Integrated System, Korea Citation Index, China National Knowledge Infrastructure, and Citation Information by NII, were searched on July 5, 2025, by independent researchers (BJ Kim, EY Ju). Moreover, gray literature will be searched using Google Scholar, and the reference lists of the relevant systematic reviews and retrieved articles will be manually examined. The search strategy will employ a combination of synonyms and related Medical Subject Headings terms (Supplementary 2).

5. Data extraction and management

1) Data extraction

All studies retrieved using the search strategy will be imported into EndNote 20.6 (Clarivate Analytics, Boston, USA), and duplicated studies will be filtered. The titles and/or abstracts of the retrieved studies, as well as those from additional sources, will be screened

by two independent researchers (BJ Kim and EY Ju) to identify studies that potentially meet the inclusion criteria outlined above. The full texts of these potentially eligible studies will be retrieved and independently assessed for eligibility by two researchers (BJ Kim and EY Ju). Any disagreements regarding the eligibility of specific studies will be resolved through discussion, and if a consensus cannot be reached, a third researcher (SH Kim) will make the final decision.

Two researchers (BJ Kim and EY Ju) will independently review and extract data from the selected studies. If no consensus can be reached, disagreements will be resolved through discussion. However, if a consensus cannot be reached, a third researcher (SH Kim) will make the final decision. We will employ a standardized data extraction form that will include the source, author, year of publication, study design, participant characteristics, concomitant diseases, intervention, comparator, duration, follow-up, outcome measurements, results, and adverse effects. Microsoft Excel 2013 (Microsoft Corporation, Washington, USA) will be used for the data and information management.

2) Risk of bias (quality) assessment

The risk of bias 2.0 Excel tool will be used to assess the quality of the studies by two independent researchers (BJ Kim, EY Ju), presented in the Cochrane Handbook for Systematic Reviews of Interventions (version 6.5), in Review Manager software version 5.4 (RevMan 5.4) (Copenhagen, The Nordic Cochrane Centre, the Cochrane Collaboration, 2020)[43]. The following characteristics will be considered: 1) randomization process, 2) deviations from intended interventions, 3) missing outcome data, 4) outcome measurement, 5) selection of reported results, and 6) overall bias. The risk of bias will be graded as high, low, or some concerns. Disagreements will be resolved by a third researcher (SH Kim).

6. Data synthesis

A narrative synthesis of the findings from the included studies will be provided. For instance, demographic characteristics of the participants and details of the experimental and control interventions, outcomes, and results will be presented. For dichotomous variables, RR was used; meanwhile, for continuous variables, MD or SMD with a 95% CI was employed. Due to the use of various scales for MRI, EEG, and blood biomarker measurements, which represent key outcome measures, the SMD will be employed. Given the heterogeneity in the demographic characteristics of the participants, severity of DEACMP, prescribed treatments, control groups, and treatment duration across the included studies, clinical heterogeneity will be considered significant. Therefore, regardless of the I^2 value, a random-effects model will be used for post-hoc analysis. However, if the number of included studies is very small, a fixed-effects model will be used for post-hoc analysis. RevMan 5.4 will be used to summarize and synthesize the effects of studies employing the same intervention and control groups. If feasible, subgroup analyses will be conducted based on treatment duration, prescription type, or fistula classification within the EAHM intervention. Additionally, we will perform a sensitivity analysis by excluding (1) studies with a high risk of bias and (2) those whose CIs do not overlap with that of the pooled effect. Sensitivity analysis will be conducted by excluding studies with a high risk of bias and those with substantial heterogeneity, specifically when the CIs of the individual scales do not overlap with the overall CI of the meta-analysis.

7. Assessment of certainty of evidence

Certainty of evidence from the included studies will be examined via the Grading of Recommen-

dations, Assessment, Development and Evaluation[44]. The level of certainty will be categorized into high, moderate, low, and very low grades, based on the risk of bias, imprecision, indirectness, inconsistency, and publication bias. Factors that may minimize certainty include the risk of bias, imprecision, indirectness, inconsistency, and publication bias. Conversely, a large magnitude of effect, a dose-response gradient, and plausible confounding factors may increase the certainty of evidence.

III. DISCUSSION

DEACMP is characterized by neuronal apoptosis and necrosis, leading to irreversible damage to neural function through ischemia and hypoxia, oxidative stress injury, and reperfusion-oxygenation injury[7,45,46]. The pathogenesis of DEACMP remains poorly understood, with effective treatment options being limited[47]. Although HBO therapy is currently the first-line treatment for DEACMP, the efficacy of this modality remains inconclusive[18]. Several studies have reported inconsistent clinical outcomes of HBO in patients with DEACMP depending on the comorbidities, hypermyotonia, and HBO treatment pressure[48,49]. This has raised concerns about the potential adverse effects associated with HBO[50].

Pharmacological interventions such as NBP, dexamethasone, and oxiracetam have been used to treat DEACMP, but they lack conclusive evidence of multi-target capability[20-24]. In contrast, EAHM, a multi-component preparation, has demonstrated neuroprotective, antioxidant, anti-inflammatory, and lipid-regulating effects across various neurological disorders[35,51,52]. The mechanisms through which individual East Asian herbs effectively treat cerebral ischemia have been identified[53-57]. Panax quinquefolius L. confers neuroprotection against ischemia-reperfusion injury through upregulating the activities of antioxidant enzymes such as catalase, superoxide dismutase, and glutathione[53]. Angelica gigas reduces the levels of oxidative stress and pro-inflammatory cytokines (TNF-α, IL-6, IL-1β), increasing cerebral blood flow and promoting neuronal recovery[54]. Astragalus membranaceus suppresses oxidative stress and exhibits neuroprotective effects by activating the Nrf2 pathway and upregulating BDNF expression via the AKT/CREB signaling pathway[55]. Polygala tenuifolia protects neurons in the process of hypoxia/reoxygenation injury by anti-apototic and anti-oxidant effects[56]. Salvia miltiorrhiza exerts neuroprotective effect in cerebral ischemia-reperfusion injury by down-regulating TLR4, p-p38MAPK, p-JNK, NF-κB, and IL-1β[57]. NBP and dexamethasone have been reported to have minor to cause adverse effects, ranging from mild to severe[25,26]. Conversely, the safety and efficacy of EAHM have been reported for the treatment of ischemic stroke[36]. Considering its traditional use in enhancing cognitive function and promoting recovery from brain injuries, the EAHM is expected to offer a viable complementary or alternative approach in the treatment of DEACMP[58-60].

IV. CONCLUSION

No comprehensive synthesis of evidence from RCTs has assessed the clinical efficacy and safety of herbal medicines for DEACMP. This systematic review and meta-analysis will be the first to evaluate the therapeutic potential of herbal medicine in the management of DEACMP by analyzing available RCTs. The findings of this study are expected to provide robust evidence for clinical decision making and contribute to the development of evidence-based guidelines. Furthermore, this review will offer critical insights for future research, including the identification of specific herbal formulae in the context of DEACMP.

SUPPLEMENTARY MATERIALS

Supplementary materials can be found via https://doi.org/10.7231/jon.2025.36.3.217

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Supplementary 1. PRISMA-P 2015 checklist

Section and topic	Item No	Checklist item	Location where item is reported
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	#1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	N/A
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	#3
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	#1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	N/A
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
Support:			
Sources	5a	Indicate sources of financial or other support for the review	N/A
Sponsor	5b	Provide name for the review funder and/or sponsor	N/A
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	N/A
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	#3
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	N/A
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	#3
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	#4

Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	N/A
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	#4
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	#4
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	#4
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	#4
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	#4
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	#5
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	#5
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	#5
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	#5
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	#5
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	#5
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	#5

Supplementary 2. Search terms used for each database

PubMed

	Searches	Results
#1	(carbon monoxide poisoning [MeSH]) OR (delayed encephalopathy after acute carbon monoxide poisoning [Title/Abstract]) OR (delayed encephalopathy [Title/Abstract]) OR (carbon monoxide intoxication [Title/Abstract]) OR (poisoning, carbon monoxide [Title/Abstract]) OR (poisonings, carbon monoxide [Title/Abstract]) OR (monoxide poisoning, carbon [Title/Abstract]) OR (monoxide poisonings, carbon [Title/Abstract]) OR (illuminating gas poisoning [Title/Abstract]) OR (poisoning, illuminating gas [Title/Abstract]) OR (poisonings, illuminating gas [Title/Abstract]) OR (gas poisoning, illuminating [Title/Abstract]) OR (gas poisonings, illuminating [Title/Abstract]) OR (ACOP [Title/Abstract]) OR (DEACMP [Title/Abstract]) OR (Encephalopath* [Title/Abstract])	
#2	(Plants, Medicinal [MeSH]) OR (Medicine, Chinese Traditional [MeSH]) OR (Medicine, Kampo [MeSH]) OR (Medicine, Korean Traditional [MeSH]) OR (Herbal Medicine [MeSH]) OR (Prescription Drugs [MeSH]) OR (traditional Korean medicine [All Fields]) OR (traditional Chinese medicine [All Fields]) OR (Traditional oriental medicine [All Fields]) OR (Kampo medicine [All Fields]) OR (alternative medicine [All Fields]) OR (complementary medicine [All Fields]) OR (herb* [All Fields]) OR (decoction* [All Fields]) OR (botanic* [All Fields])	
#3	#1 AND #2	

Embase via Elsevier

	Searches	Results
#1	"carbon monoxide intoxication"/exp OR “carbon monoxide intoxication”:ab,ti OR "illuminating gas poisoning":ab,ti OR "delayed encephalopathy after acute carbon monoxide poisoning":ab,ti OR "delayed encephalopathy":ab,ti OR "DEACMP":ab,ti OR "ACOP":ab,ti OR "Encephalopath*":ab,ti	
#2	"medicinal plant"/exp OR "medicinal plant" OR "chinese medicine"/exp OR "chinese medicine":ab,ti OR "kampo medicine"/exp OR "kampo medicine":ab,ti OR ("kampo medicine"/exp AND "drug"/exp) OR "kampo medicine (drug)":ab,ti OR "korean medicine"/exp OR "korean medicine":ab,ti OR "herbal medicine"/exp OR "herbal medicine":ab,ti OR "prescription drug"/exp OR "prescription drug":ab,ti OR "oriental medicine"/exp OR "oriental medicine":ab,ti OR "alternative medicine"/exp OR "alternative medicine":ab,ti OR "complementary medicine":ab,ti OR "herb"/exp OR "herb":ab,ti OR "decoction*":ab,ti OR "botanic*":ab,ti	
#3	#1 AND #2	

CENTRAL

	Searches	Results
#1	MeSH descriptor: [carbon monoxide poisoning] explode all trees	
#2	MeSH descriptor: [illuminating gas poisoning] explode all trees	
#3	carbon monoxide intoxication: ab,ti,kw	
#4	delayed encephalopathy after acute carbon monoxide poisoning:ti,ab,kw (Word variations have been searched)	
#5	delayed encephalopathy:ti,ab,kw (Word variations have been searched)	
#6	DEACMP (Word variations have been searched)	
#7	ACOP (Word variations have been searched)	
#8	Encephalopath* (Word variations have been searched)	
#9	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8	
#10	MeSH descriptor: [Plants, Medicinal] explode all trees	
#11	MeSH descriptor: [Drugs, Chinese Herbal] explode all trees	
#12	MeSH descriptor: [Medicine, Chinese Traditional] explode all trees	
#13	MeSH descriptor: [Medicine, Korean Traditional] explode all trees	

#14	MeSH descriptor: [Medicine, Kampo] explode all trees	
#15	MeSH descriptor: [Prescription Drugs] explode all trees	
#16	MeSH descriptor: [Herbal Medicine] explode all trees	
#17	Traditional oriental medicine (Word variations have been searched)	
#18	alternative medicine (Word variations have been searched)	
#19	complementary medicine (Word variations have been searched)	
#20	herb* (Word variations have been searched)	
#21	decoction* (Word variations have been searched)	
#22	botanic* (Word variations have been searched)	
#23	#10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22	
#24	#9 and #23	

Web of Science

	Searches	Results
#1	TI=("carbon monoxide intoxication") OR AB=("carbon monoxide intoxication") OR AK=("carbon monoxide intoxication") OR TI=("carbon monoxide poisoning") OR AB=("carbon monoxide poisoning") OR AK=("carbon monoxide poisoning") OR TI=("illuminating gas poisoning") OR AB=("illuminating gas poisoning") OR AK=("illuminating gas poisoning") OR TI=("delayed encephalopathy after acute carbon monoxide poisoning") OR AB=("delayed encephalopathy after acute carbon monoxide poisoning") OR AK=("delayed encephalopathy after acute carbon monoxide poisoning") OR TI=("delayed encephalopathy") OR AB=("delayed encephalopathy") OR AK=("delayed encephalopathy") OR TI=("DEACMP") OR AB=("DEACMP") OR AK=("DEACMP") OR TI=("ACOP") OR AB=("ACOP") OR AK=("ACOP") OR TI=("Encephalopath*") OR AB=("Encephalopath*") OR AK=("Encephalopath*")	
#2	TI=("Plants, Medicinal") OR AB=("Plants, Medicinal") OR AK=("Plants, Medicinal") OR TI=("Drugs, Chinese Herbal") OR AB=("Drugs, Chinese Herbal") OR AK=("Drugs, Chinese Herbal") OR TI=("Medicine, Chinese Traditional") OR AB=("Medicine, Chinese Traditional") OR AK=("Medicine, Chinese Traditional") OR TI=("Medicine, Korean Traditional") OR AB=("Medicine, Korean Traditional") OR AK=("Medicine, Korean Traditional") OR TI=("Medicine, Kampo") OR AB=("Medicine, Kampo") OR AK=("Medicine, Kampo") OR TI=("Prescription Drugs") OR AB=("Prescription Drugs") OR AK=("Prescription Drugs") OR TI=("Herbal Medicine") OR AB=("Herbal Medicine") OR AK=("Herbal Medicine") OR TI=("Traditional oriental medicine") OR AB=("Traditional oriental medicine") OR AK=("Traditional oriental medicine") OR TI=("alternative medicine") OR AB=("alternative medicine") OR AK=("alternative medicine") OR TI=("complementary medicine") OR AB=("complementary medicine") OR AK=("complementary medicine") OR TI=("herb*") OR AB=("herb*") OR AK=("herb*") OR TI=("decoction*") OR AB=("decoction*") OR AK=("decoction*") OR TI=("botanic*") OR AB=("botanic*") OR AK=("botanic*")	
#3	#1 AND #2	

Scopus via Elsevier

	Searches	Results
#1	TITLE-ABS-KEY("carbon monoxide intoxication") OR TITLE-ABS-KEY("carbon monoxide poisoning") OR TITLE-ABS-KEY("illuminating gas poisoning") OR TITLE-ABS-KEY("delayed encephalopathy after acute carbon monoxide poisoning") OR TITLE-ABS-KEY("delayed encephalopathy") OR TITLE-ABS-KEY("DEACMP") OR TITLE-ABS-KEY("ACOP") OR TITLE-ABS-KEY("Encephalopath*")	
#2	TITLE-ABS-KEY("Plants, Medicinal") OR TITLE-ABS-KEY("Drugs, Chinese Herbal") OR TITLE-ABS-KEY("Medicine, Chinese Traditional") OR TITLE-ABS-KEY("Medicine, Korean Traditional") OR TITLE-ABS-KEY("Medicine, Kampo") OR TITLE-ABS-KEY("Prescription Drugs") OR TITLE-ABS-KEY("Herbal Medicine") OR TITLE-ABS-KEY("Traditional oriental medicine") OR TITLE-ABS-KEY("alternative medicine") OR TITLE-ABS-KEY("complementary medicine") OR TITLE-ABS-KEY("herb*") OR TITLE-ABS-KEY("decoction*") OR TITLE-ABS-	

	KEY("botanic*")	
#3	#1 AND #2	

AMED via EBSCO

	Searches	Results
#1	(TX "carbon monoxide intoxication") OR (TX "carbon monoxide poisoning") OR (TX "illuminating gas poisoning") OR (TX "delayed encephalopathy after acute carbon monoxide poisoning") OR (TX "delayed encephalopathy") OR (TX "DEACMP") OR (TX "ACOP") OR (TX "Encephalopath*")	
#2	(TX "Plants, Medicinal") OR (TX "Drugs, Chinese Herbal") OR (TX "Medicine, Chinese Traditional") OR (TX "Medicine, Korean Traditional") OR (TX "Medicine, Kampo") OR (TX "Prescription Drugs") OR (TX "Herbal Medicine") OR (TX "Traditional oriental medicine") OR (TX "alternative medicine") OR (TX "complementary medicine") OR (TX "herb*") OR (TX "decoction*") OR (TX "botanic*")	
#3	#1 AND #2	

PsycARTICLES via ProQuest

	Searches	Results
#1	((MAINSUBJECT.EXACT.EXPLODE ("carbon monoxide intoxication") OR ("carbon monoxide poisoning") OR ("illuminating gas poisoning") OR ("delayed encephalopathy after acute carbon monoxide poisoning") OR ("delayed encephalopathy") OR ("DEACMP") OR ("ACOP") OR ("Encephalopath*")	
#2	(MAINSUBJECT.EXACT.EXPLODE ("Plants, Medicinal") OR MAINSUBJECT.EXACT.EXPLODE ("Drugs, Chinese Herbal") OR MAINSUBJECT.EXACT.EXPLODE ("Medicine, Chinese Traditional") OR MAINSUBJECT.EXACT.EXPLODE ("Medicine, Korean Traditional") OR MAINSUBJECT.EXACT.EXPLODE ("Medicine, Kampo") OR MAINSUBJECT.EXACT.EXPLODE ("Prescription Drugs") OR MAINSUBJECT.EXACT.EXPLODE ("Herbal Medicine")) OR ("Traditional oriental medicine") OR ("alternative medicine") OR ("complementary medicine") OR (herb*) OR (decoction*) OR (botanic*)	
#3	#1 AND #2	

OASIS

	Searches	Results
#1	(지연성뇌병증 OR 일산화탄소) AND (한약)	

KCI

	Searches	Results
#1	(지연성뇌병증 OR 일산화탄소) AND (한약)	

CNKI

	Searches	Results
#1	SU="carbon monoxide intoxication" OR SU="carbon monoxide poisoning" OR SU= “illuminating gas poisoning" OR SU=“delayed encephalopathy after acute carbon monoxide poisoning" OR SU="delayed encephalopathy" OR SU="DEACMP" OR SU="ACOP" OR SU="Encephalopathy” OR SU="一氧化碳中毒" OR SU="急性一氧化碳中毒" OR SU="照明气中毒" OR SU="急性一氧化碳中毒迟发性脑病" OR SU="迟发性脑病" OR SU="脑病" OR SU="气体中毒"	
#2	SU='中药' OR SU='汤' OR SU='散' OR SU='丸' OR SU='方' OR SU='颗粒' OR SU='胶囊' OR SU='自	

	拟'	
#3	#1 AND #2	

CiNii

	Searches	Results
#1	carbon monoxide intoxication OR carbon monoxide poisoning OR illuminating gas poisoning OR delayed encephalopathy after acute carbon monoxide poisoning OR delayed encephalopathy OR DEACMP OR ACOP OR Encephalopathy OR 一酸化炭素 OR 一酸化炭素中毒 OR 急性一酸化炭素中毒 OR 照明ガス中毒 OR 急性一酸化炭素中毒遅発性脳症 OR 急性一酸化炭素中毒遅発性 脳症 OR 急性一酸化炭素中毒 遅発性 脳症 OR 遅発性脳症 OR 遅発性 脳症 OR 脳症 OR ガス中毒 OR いっさんかたんそちゅうどく OR きゅうせいいっさんかたんそちゅうどく OR ちはつせいのうしょう OR ちはつせい のうしょう OR ちはつせい のうびょうへん OR ちはつせい のう びょうへん OR ちはつせい のうしょうがい OR ちはつせい のうしょうがい OR ちはつせい どくせい OR ちはつせいどくせい	
#2	chinese medicine OR herbal medicine OR kampo OR 東洋医学 OR 漢方 OR 湯 OR 散 OR 丸 OR 方 OR 飲 OR 煎 OR 顆粒	
#3	#1 AND #2	

Google Scholar

	Searches	Results
#1	("carbon monoxide poisoning" OR "illuminating gas poisoning" OR "delayed encephalopathy after acute carbon monoxide poisoning" OR "delayed encephalopathy" OR "DEACMP" OR "ACOP" OR "Encephalopath*") AND ("Plants, Medicinal" OR "Drugs, Chinese Herbal" OR "Medicine, Chinese Traditional" OR "Medicine, Korean Traditional" OR "Medicine, Kampo" OR "Prescription Drugs" OR "Herbal Medicine" OR "Traditional oriental medicine" OR "alternative medicine" OR "complementary medicine" OR "herb*" OR "decoction*" OR "botanic*") AND ("working paper" OR "technical report" OR "white paper") -journal –book - conference proceeding – thesis - dissertation	