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STUDY PROTOCOL

Analysis of Acupoint Selection and Combinations in Acupuncture Treatment of Trigeminal Neuralgia: A Protocol for Data Mining

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Background: Trigeminal neuralgia is a prevalent neurological disorder within neuropathic pain. It severely impairs patients' quality of life, disrupting daily activities with intense facial pain. While acupuncture has proven effective in treating it, there's no consensus on acupoint selection. Different acupuncturists use various acupoints based on personal theories and experiences, and the optimal acupoints remain unclear due to varied analgesic mechanisms. This lack of clarity obstructs the standardization of acupuncture treatment, emphasizing the need for further research.

Objective: Our purpose is to conduct the first thorough data mining analysis to identify the most effective acupoint selection and combinations for treating trigeminal neuralgia from published clinical trials.

Methods: We will search 8 electronic bibliographic databases (PubMed, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure, Wanfang Database, Chinese Biomedical Literature Database and Chongqing VIP Database) from inception to May 2025. Clinical trials assessing the effectiveness of acupuncture therapy on the management of trigeminal neuralgia will be selected. We will strictly screen literature according to inclusion and exclusion criteria, and then extract relevant data for analysis. Descriptive statistics will be performed in Excel 2021. Association rule analysis will be performed in SPSS Modeler 14.1. Exploratory factor analysis, cluster analysis, and decision tree analysis will be performed in SPSS Statistics 26.0. Since the study was based on published studies, no ethical approval was required.

Results: This study will investigate the most effective acupoint selection and combinations for patients with trigeminal neuralgia.

Conclusion: Our findings will provide evidence for the effectiveness and potential treatment prescriptions of acupoint application for patients with trigeminal neuralgia, helping clinicians and patients make a more informed decision together.

Keywords: acupuncture, trigeminal neuralgia, data mining, descriptive statistics, association rule analysis, exploratory factor analysis, cluster analysis, decision tree analysis

Keypoints

1. Because these acupuncture methods possess distinct theoretical foundations that diverge from conventional acupoint theory, their inclusion in the study is inappropriate.
2. As we believe that in this context, surgery rather than acupuncture serves as the primary treatment for trigeminal neuralgia. Additionally, the neurophysiological aspects post-surgery may differ from those before surgery.

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Introduction

Trigeminal neuralgia is the most common facial neuralgia classified under neuropathic pain.[1] It is characterized by a high incidence rate and significant disability, severely affecting patients' quality of life.[2] Trigeminal neuralgia presents with sudden, brief, and excruciating pain in the areas innervated by the trigeminal nerve on the face. The pain is often described as electric-shock-like or knife-cutting, causing involuntary facial muscle twitching.[3] This condition greatly disrupts patients' daily activities such as eating, speaking, and washing, significantly reducing their overall comfort.[4] Therefore, it is necessary to take active measures to solve trigeminal neuralgia clinically.[1] Currently, treatments for trigeminal neuralgia include pharmacotherapy, surgery, and nerve block therapy. However, these approaches all carry certain risks and adverse reactions.[5,6]

Acupuncture, a traditional Chinese medical therapy, has demonstrated unique advantages in the treatment of trigeminal neuralgia. Multiple clinical studies have confirmed that acupuncture can effectively alleviate the pain intensity and reduce the frequency of pain attacks in patients with trigeminal neuralgia.[7–9] Nevertheless, in the clinical practice of acupuncture for trigeminal neuralgia, there is a significant disparity in acupoint selection and combinations. Even in authoritative textbooks of acupuncture, there are discrepancies in acupoint selection for this disease, such as disagreements on the choice between Chengjiang (CV24)[10] and Jiachengjiang (an extra point near Chengjiang).[11] Different practitioners choose various acupoints based on their own theoretical understandings and clinical experiences, resulting in a lack of a unified standard for treatment protocols and making it difficult to ensure optimal therapeutic effects. The selection and combination of acupoints are the core of acupuncture treatment.[12] A rational combination of acupoints can enhance the synergistic effect and improve the therapeutic efficacy of acupuncture. Therefore, in-depth analysis of the rules of acupoint selection and combination in the acupuncture treatment of trigeminal neuralgia is of great significance for optimizing treatment plans and improving clinical outcomes.

Data mining technology, a powerful data-analysis tool, can extract potential and valuable information from vast amounts of literature data.[13] By leveraging data-mining methods, it is possible to systematically organize the application of acupoints in the acupuncture treatment of trigeminal neuralgia and reveal the internal relationship between acupoint selection and therapeutic effects. Based on this, our research team has applied data-mining technology to explore the rules of acupoint selection in the acupuncture treatment of various diseases[14–20] and achieved certain results. This study aims to leverage our existing proficiency in various data - mining techniques. We further delve into the acupuncture point - selection patterns for trigeminal neuralgia treatment. By employing data - mining technology, we conduct an in - depth analysis of these patterns. This enables us to offer more scientific and standardized treatment guidelines for clinical practice.

Methods and Analysis

Search Methods

This study will adhere to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Statement.[21] A thorough search will be carried out in both Chinese and English electronic libraries, spanning from their inception to May 2025. The selected databases for the search are PubMed, Embase, Cochrane Library, Web of Science (WOS), China National Knowledge Infrastructure (CNKI), Wanfang Database, Chinese Biomedical Literature Database (CBM), and Chongqing VIP Database (VIP). The search will be limited to Chinese and English languages.

The search terms employed in this review will be a blend of medical subject headings and free-text terms. As an example, Table 1 presents the search strategy for PubMed. Given the distinct characteristics of each database, this search approach will be adjusted accordingly to meet the specific constraints of each database.

Review Process

Data Screening

The inclusion criteria are as follows:[1] The main focus of the study should be acupuncture therapy, regardless of whether randomized and/or controlled methods are employed.[2] Each group or trial must involve more than ten patients.[3] The diagnosis of trigeminal neuralgia in patients should be based on the authoritative diagnostic criteria applicable in the corresponding clinical studies at that time.[4] Meridian points, extra points, or ashi points need to be used for needle insertion and/or moxibustion. These

Table 1 Search Strategy for PubMed Database

No.	Search Terms
#1	MeSH terms: "trigeminal neuralgia"
#2	Title/Abstract: "trigeminal neuralgia" OR "primary trigeminal neuralgia" OR "idiopathic trigeminal neuralgia" OR "classical trigeminal neuralgia"
#3	#1 OR #2
#4	MeSH terms: "acupuncture therapy" OR "acupuncture" OR "cupping therapy" OR "bloodletting" OR "electroacupuncture"
#5	Title/Abstract: "needling" OR "needles" OR "needle" OR "pricking blood" OR "blood-letting" OR "bloodletting" OR "cupping" OR "fire acupuncture" OR "warm needling" OR "electro-acupuncture" OR "body acupuncture" OR "electroacupuncture" OR "manual acupuncture" OR "acupuncture"
#6	#4 OR #5
#7	#3 AND #6

can be used alone or in combination with other interventions like acupuncture and/or moxibustion (eg, in conjunction with Chinese herbal medicine).[5] Studies comparing different acupuncture techniques for treating trigeminal neuralgia.

The exclusion criteria are as follows:[1] Non-clinical experimental articles such as reviews, protocols, animal studies, case reports, systematic reviews, and meta-analyses will not be included.[2] Articles that have not undergone rigorous peer-review, including but not limited to theses and conference papers, will be excluded.[3] Trials using microacupuncture systems, ear needles, head needles, wrist-ankle needles, and other non-body needle methods will be excluded [1].[4] Trials that only report physiological or laboratory data will be omitted.[5] In controlled trials, if acupuncture therapy, either alone or in combination, shows less beneficial effects for patients compared to the control group, the study will be excluded.[6] Studies with incomplete or missing acupoint prescriptions will not be included.[7] Acupuncture used in postoperative rehabilitation for trigeminal neuralgia was excluded [2].

Data Collection

Yujun He and Yachao Wu will each independently review all titles and abstracts retrieved from the literature search. Any that are clearly not relevant, like those focusing on reviews, animal experiments, case reports, and similar areas, will be removed. The full texts of the remaining references will be collected and re-examined to weed out any publications that are still not relevant. Afterward, they will evaluate the eligibility of the remaining papers in line with the pre-defined inclusion criteria. A consensus-building process will be carried out, and in case of disagreements, a third author, Xiaojun Li, will be consulted. The three will engage in discussions to reach a resolution.

Establishing a Database and Processing Data Normalization

We will utilize the document management software Endnote×9.2 to import the literature retrieved from the search. Initially, Endnote will be employed to identify and remove duplicate records. Subsequently, a manual check will be conducted to further eliminate any remaining duplicates, ensuring the integrity of the dataset. Afterward, the results will be verified to guarantee the accuracy of the included literature. The research screening process will be visually presented in Figure 1 as a flow diagram.

The extracted data will be inputted into Excel 2021 to construct a database for acupuncture treatment prescriptions for trigeminal neuralgia. To obtain valid prescriptions, we will adopt the approach where "a set of primary acupoints and a set of secondary acupoints form an acupoint prescription".[22] When different prescriptions are used during distinct treatment stages, they will be separately extracted. In cases where multiple prescriptions are used simultaneously, the acupoints will be combined, and duplicate acupoints will be removed. Based on the latest national standards,[23,24] we will standardize the acupoint names in the literature, creating a unified naming system. Moreover, we will add details about the meridians to which the acupoints belong, their locations, and their specific acupoint attributes.

This process will be independently completed by two researchers (Miao Zhou, Yi Xu). If there is a disagreement, consult with the third researcher (Xiaoyi Wang) to resolve it.

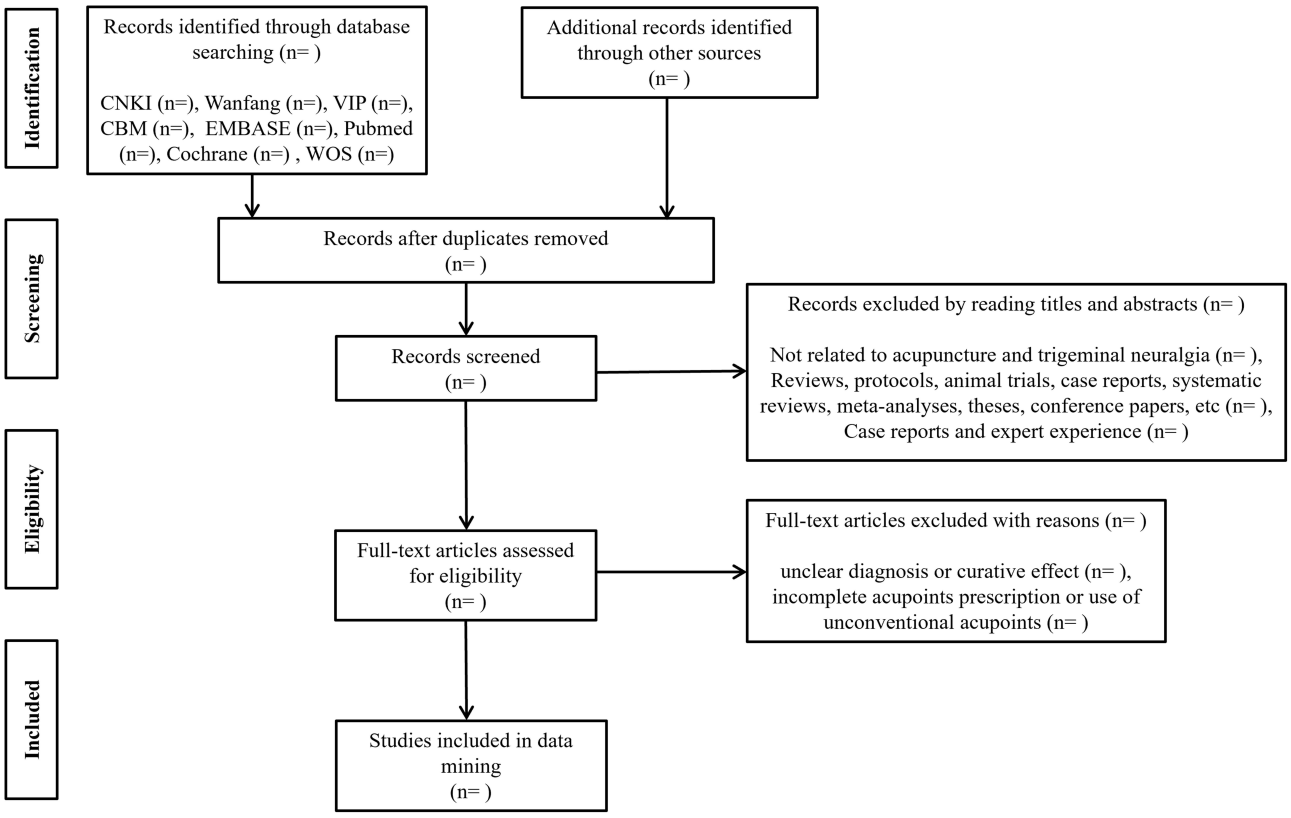

Figure 1 Flow diagram of the study selection process.

Managing Missing Data

In an effort to conduct an intention-to-treat analysis of the data, we plan to reach out to the original authors. Our aim is to acquire any missing data that is crucial for a comprehensive evaluation. However, if we are unable to obtain all the necessary information through this method, we will limit our assessment to the data that is currently available.

Data Analysis

Literature Quality Evaluation

Two reviewers, Yachao Wu and Minhui Liu, will independently apply the STRICTA scale to evaluate reports of specific acupuncture interventions.[25] After individual assessments, a consistency check will be performed to ensure reliability. In cases of disagreement, the reviewers will first engage in direct discussion to reach a consensus. If unresolved, a third researcher (Xiaojun Li) will be consulted to facilitate collaborative resolution, ensuring rigorous and impartial evaluation of the included studies.

Descriptive Statistics

Building on prior research methods,[15,17–20] acupoint prescriptions extracted from the literature will be compiled into an Excel 2021 spreadsheet. Using the spreadsheet's PivotTable functionality, we will conduct descriptive statistical analyses to examine multiple dimensions, including the frequency of acupoint utilization, their associated meridians, sites, and specific acupoints attributes (Tables 2–5).

High-Frequency Acupoints Analysis

Following Price's law, high-frequency acupoints will be identified using the formula $M=0.749\ (Pmax)^{1/2}$, where Pmax denotes the highest recorded acupoint frequency.[26] Should the number of high-frequency acupoints identified by this

Table 2 Frequency of Acupoint Application for Trigeminal Neuralgia Treatment

No.	Acupoint	Frequency (%)

Table 3 Frequency of Meridian Application for Trigeminal Neuralgia Treatment

Meridian	Frequency (%)	Amount (%)	Acupoints

Note: "Frequency (%)" refers to the total number of times and its percentage that all acupoints in a particular meridian are used in all prescriptions. "Amount (%)" indicates the count and percentage of distinct acupoints that have appeared in a particular meridian.

Table 4 Frequency of Site of Point Application for Trigeminal Neuralgia Treatment

Site of Points	Frequency (%)	Amount (%)	Acupoints

Note: "Frequency (%)" refers to the total number of times and its percentage that all acupoints in a particular site are used in all prescriptions. "Amount (%)" indicates the count and percentage of distinct acupoints that have appeared in a particular site.

Table 5 Frequency of Specific Acupoints for Trigeminal Neuralgia Treatment

Specific Acupoint	Frequency (%)	Amount (%)	Acupoints

Note: "Frequency (%)" refers to the total number of times and its percentage that all acupoints in a particular specific acupoint are used in all prescriptions. "Amount (%)" indicates the count and percentage of distinct acupoints that have appeared in a particular specific acupoint.

method exceed 50 an alternative approach will be adopted: calculating the mean frequency (X) as the total frequency divided by the total number of acupoints, with acupoints having a frequency ≥ X designated as high-frequency.[27] High-frequency acupoints will be visualized using bar charts created with GraphPad 8.0.

Association Rule Analysis

Following methodologies from prior research,[15,17–20] association rule analysis of high-frequency acupoints will be undertaken using SPSS Modeler 14.1 with the Apriori algorithm. Support degree will define the probability of co-occurrence for antecedent and consequent items, while confidence degree will represent the conditional probability of the

Table 6 Association Rules of Acupoints for Trigeminal Neuralgia Treatment

NO.	Latteritem	Formeritem	Frequency	Support (%)	Confidence (%)	Lift

consequent item appearing given the antecedent item is present. Through iterative testing, optimal thresholds for minimum support and minimum confidence will be established, with the former set at a maximum value of 2 (Table 6). An intricate network diagram will then be constructed to visualize associations between acupoints.

Exploratory Factor Analysis

Following methodologies from prior research,[15,17–20] exploratory factor analysis of high-frequency acupoints will be performed using SPSS Statistics 26.0. Prescription data will first undergo Kaiser-Meyer-Olkin (KMO) and Bartlett sphericity tests. Factor analysis will be conducted when the KMO value exceeds 0.5 and the Bartlett test yields a p-value < 0.05, with principal factor components extracted via maximum variance rotation. Conversely, if the KMO measure is ≤ 0.5 or the Bartlett test p-value ≥ 0.05, factor analysis will be deemed inappropriate for the dataset.

Cluster Analysis

Following methodologies from prior research,[15,17–20] cluster analysis of high-frequency acupoints will be performed using SPSS Statistics 26.0. The between-groups linkage method will be employed for clustering, with the measurement interval set as Pearson correlation. Cluster numbers will be configured to range from a minimum of 5 to a maximum of 10. The dendrogram generated by SPSS through this analysis will be used to explore the clustering relationships among acupoints.

Decision Tree Analysis

Following the methodology of prior research,[26] acupoint data will undergo decision tree modeling via the CHAID algorithm in SPSS Statistics 26.0. The goal is to identify the most efficient treatment strategy for trigeminal neuralgia by optimizing acupoint selection to minimize the number of points used. The CHAID algorithm is well-suited for binary variables, where acupoint utilization is coded as "1" (used) or "0" (not used). For cross-validation, a 10-fold resampling strategy will be applied. Model parameters will be configured with a minimum case count of 100 for parent nodes and 50 for child nodes to ensure statistical robustness. After setting these parameters, the decision tree model will be generated to visualize hierarchical relationships and optimal acupoint combinations for treatment.

Discussion

While recent advances have introduced non-pharmacologic therapies offering alternatives for patients with trigeminal neuralgia intolerant to or not well-served by medications, many sufferers still lack satisfactory pain relief.[6] This underscores the urgent need for effective, well-tolerated trigeminal neuralgia-specific treatments.[6,28]

Clinical trials have shown acupuncture to be effective in reducing pain intensity, duration, and frequency, and lowering reliance on pain medications.[8,9,29–31] According to traditional Chinese medicine, facial acupoints are commonly used in clinical practice to directly stimulate and regulate neural structures and blood flow in the trigeminal nerve region.[32] However, it's not only facial acupoints that can influence trigeminal neuralgia;[33,34] acupoints located elsewhere on the body (such as "Shousanli" (LI10) and "Quchi" (LI11)) may also play a role, possibly through different mechanisms.[35] For instance, acupuncture at certain acupoints can trigger the release of endogenous substances with analgesic and anti-inflammatory properties.[36] Given this, it is crucial to use scientific methods to determine the most effective choices and combinations of acupoints.

In order to explore the underlying principles, we will employ data mining techniques. This approach is highly promising and practical, as it can uncover valuable information hidden within vast amounts of data. Data mining technology operates by leveraging various algorithms to establish connections between individual data elements. It

meticulously counts the occurrence frequency of each item in the database and pinpoints associations with other elements, thus effectively clarifying the most significant relationships among different factors.[37] By conducting descriptive statistical analysis, we aim to identify the commonly used acupoints, meridians, acupoint locations, and specific acupoints in the treatment of trigeminal neuralgia. Association rule mining, a key data mining technique, applies rule-based machine learning algorithms to detect relationships within a dataset and generate conditional rules.[38–40] The Apriori algorithm, a well-known example of association rule mining, focuses on identifying frequently occurring item sets in a database.[41] Exploratory factor analysis, a statistical method within the realm of factor analysis, is utilized to uncover the latent structure of variable sets and explain the correlations between observable variables.[42] Its objective is to reveal the potential structure of a measurement scale and streamline the number of variables. It does so by identifying and grouping variables that convey redundant information about data variability; these grouped variables are known as factors.[43] Clustering analysis is a pattern recognition method that groups similar objects together from diverse data sources.[44] This technique helps users to disentangle the data structure and simplify data complexity by extracting meaningful patterns from large-scale information.[45] Decision tree analysis is a powerful tool for knowledge-based decision-making. It is based on a recursive tree-structured classification model. The algorithm uses index factors to represent data and classifies spatial attributes through a tree structure for decision-making. The root node is defined by the criteria of index factor classification. Each sub-node represents a classification problem related to index factors. Classification is carried out based on the levels of index factors, dividing data into two or more subsets. Each subset can be further classified iteratively until leaf nodes are formed. A leaf node represents the lowest-level classification under multiple indicator attributes. Each path from the root node to a leaf node represents a specific classification rule.[46,47] Given that different data mining methods have their own unique characteristics, each method has its own set of advantages and limitations. We will integrate the analysis results from these various data mining methods to provide comprehensive and multi-dimensional references. The research methodology proposed in this study is expected to identify the most effective acupoint selection and combinations for trigeminal neuralgia treatment, offering evidence-based support for clinical practice.

Nevertheless, our experimental protocol inevitably has some limitations. First, combinations of electroacupuncture, moxibustion, and other treatment methods may introduce significant heterogeneity that may not be fully captured or considered in data mining. Different techniques may have different optimal acupoint selections or mechanisms. Therefore, future research could consider conducting subgroup analyses on each acupuncture method. Second, due to the result of data mining technique reliance on reported data and variability in study design, the results of this study are still theoretical and need to be further confirmed through well-designed clinical trials. Despite these shortcomings, compared with our previous data mining studies on acupoint applications for other diseases, the results will still make a certain contribution to clinical decision-making.

Conclusion

The results of this study are anticipated to offer substantial evidence regarding the efficacy of acupoint application and potential treatment regimens for trigeminal neuralgia patients. By analyzing a wealth of data through various data-mining techniques, we aim to uncover the most effective acupoint selection and combinations. This information will serve as a valuable resource for both clinicians and patients. Clinicians can utilize these findings to optimize their treatment plans, choosing acupoints based on scientific evidence rather than relying solely on traditional practices or individual experience. This evidence-based approach is likely to enhance the treatment outcomes and improve patients' quality of life. Patients, on the other hand, will be better informed about the potential benefits and mechanisms of acupuncture treatment. They can actively participate in the decision-making process, collaborating with their healthcare providers to select the most suitable treatment options. In this way, the research results will bridge the gap between medical knowledge and patient care, facilitating more informed and collaborative decision-making in the treatment of trigeminal neuralgia.

Patient and Public Involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Ethical Statement

Since the study was based on published clinical studies, no ethical approval was required.

Author Contributions

All authors significantly contributed to this research in aspects like conception, design, execution, data analysis and interpretation, either focusing on specific areas or being involved comprehensively. They participated in manuscript drafting, revision, and critical review, reached an agreement on the submission journal, gave final approval for the publishable version, and agreed to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

References

1. Wang H, Chen C, Chen D, et al. Clinical analysis of the treatment of primary trigeminal neuralgia by percutaneous balloon compression. *Front Surg*. 2022;9:843982. doi:10.3389/fsurg.2022.843982
2. Freigang S, Fresnoza S, Lehner C, et al. Twenty-three months repetitive transcranial magnetic stimulation of the primary motor cortex for refractory trigeminal neuralgia: a single-case study. *Life*. 2023;13(1). doi:10.3390/life13010126
3. Allam AK, Sharma H, Larkin MB, Viswanathan A. Trigeminal neuralgia: diagnosis and treatment. *Neurolog Clin*. 2023;41(1):107–121. doi:10.1016/j.ncl.2022.09.001
4. Singhota S, Tchantchaleishvili N, Wu J, et al. Long term evaluation of a multidisciplinary trigeminal neuralgia service. *J Headache Pain*. 2022;23(1):114. doi:10.1186/s10194-022-01489-7
5. Lambru G, Zakrzewska J, Matharu M. Trigeminal neuralgia: a practical guide. *Prac Neurol*. 2021;21(5):392–402. doi:10.1136/practneurol-2020-002782
6. Bendtsen L, Zakrzewska JM, Heinskou TB, et al. Advances in diagnosis, classification, pathophysiology, and management of trigeminal neuralgia. *Lancet Neurol*. 2020;19(9):784–796. doi:10.1016/S1474-4422(20)30233-7
7. Gao J, Zhao C, Jiang W, Zheng B, He Y. Effect of acupuncture on cognitive function and quality of life in patients with idiopathic trigeminal neuralgia. *J Nervous Mental Disease*. 2019;207(3):171–174. doi:10.1097/NMD.0000000000000937
8. Li R, Sun J, Luo K, et al. Electroacupuncture and carbamazepine for patients with trigeminal neuralgia: a randomized, controlled, 2 × 2 factorial trial. *J Neurol*. 2024;271(8):5122–5136. doi:10.1007/s00415-024-12433-x
9. Ichida MC, Zemuner M, Hosomi J, et al. Acupuncture treatment for idiopathic trigeminal neuralgia: a longitudinal case-control double blinded study. *Chin J Integrat Med*. 2017;23(11):829–836. doi:10.1007/s11655-017-2786-0
10. Liang Fanrong WHe. *Acupuncture and Moxibustion*. 4th Edition of the New Century. Beijing: China Press of Traditional Chinese Medicine; 2016.
11. Gao Shuzhong YJ. *Acupuncture and Moxibustion Therapy*. 4th New Century ed. Edition. Beijing: China Press of Traditional Chinese Medicine; 2016:26.
12. Tu M, Xiong S, Lv S, et al. Acupuncture for major depressive disorder: a data mining-based literature study. *Neuropsychiatr Dis Treat*. 2023;19:1069–1084. doi:10.2147/NDT.S405728
13. Yu S, Yang J, Yang M, et al. Application of acupoints and meridians for the treatment of primary dysmenorrhea: a data mining-based literature study. *Evidence-Based Complemen Alternat Med*. 2015;2015:752194. doi:10.1155/2015/752194
14. He Y, Miao F, Fan Y, et al. Analysis of acupoint selection and combinations in acupuncture treatment of carpal tunnel syndrome: a protocol for data mining. *J Pain Res*. 2023;16:1941–1948. doi:10.2147/JPR.S411843
15. He Y, Miao F, He C, et al. A data mining study for analysis of acupoint selection and combinations in acupuncture treatment of carpal tunnel syndrome. *J Pain Res*. 2024;17:1153–1170. doi:10.2147/JPR.S452618
16. He Y, Miao F, Fan Y, et al. Analysis of acupoint selection and combinations in acupuncture treatment of piriformis syndrome: a protocol for data mining. *J Pain Res*. 2023;16:3265–3272. doi:10.2147/JPR.S422857
17. He Y, Y FAN, Miao F, Zhang H, Lin R, Huang NQJ. Acupoint selection law of acupuncture in treating piriformis syndrome based on data mining Chinese. *J Inform Trad Chin Med*. 2023;30(07):15–21.
18. He Y, Miao F, Y FAN, et al. Analysis on acupoint selection law of acupuncture and moxibustion in treating benign prostatic hyperplasia based on data mining. *Chin J Inform Trad Chin Med*. 2023;30(11):25–31.
19. He YJ, Fan YS, Miao FR, et al. Acupoint selection rules of acupuncture and moxibustion in treating neurogenic bladder based on data mining. *Zhen Ci Yan Jiu*. 2024;49(2):198–207. doi:10.13702/j.1000-0607.20230018
20. He YJ, He JJ, Fan YS, et al. Analysis on acupoint selection rules in the treatment of metabolism-associated fatty liver disease based on data mining. *Zhen Ci Yan Jiu*. 2024;49(4):424–433. doi:10.13702/j.1000-0607.20221333
21. Page MJ, Moher D, Bossuyt PM, et al. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ*. 2021;372:n160. doi:10.1136/bmj.n160

22. Chen J, Xie Y, Lin Q, et al. Investigating acupoint selection and combinations of acupuncture for tic disorders: an association rule mining and network analysis study. *Front Neurol*. 2022;13:894951. doi:10.3389/fneur.2022.894951
23. SAfM R, SAotPsRo C. *Nomenclature and Location of Meridian Points:gb/T 12346—2021(in Chinese)*. Beijing:Standards Press of China; 2021.
24. State Administration for Market Regulation SAotPsRoC. *Nomenclature and Location of Extra Points in Common Use:gb/T 40997—2021(in Chinese)*. Beijing:Standards Press of China; 2021.
25. MacPherson H, White A, Cummings M, Jobst K, Rose K, Niemtzow R. Standards for reporting interventions in controlled trials of acupuncture: the STRICTA recommendations. *Complemen Therap Med*. 2001;9(4):246–249. doi:10.1054/ctim.2001.0488
26. Zhang F, Y FAN, Miao F, He Y. Analysis on acupoint selection rules of acupuncture in treating perimenopausal syndrome based on data mining. *Chin J Inform Trad Chin Med*. 2019;14:1–8. doi:10.1186/s13020-018-0223-8
27. Yujun HE, Jiujie HE, Yushan FAN, Miao F, Rui LIN, Qin N. Clinical application of fengchi acupoint in ancient books based on data mining technology. *Chin J Inform Trad Chin Med*. 2023;30(12):45–50.
28. Di Carlo DT, Benedetto N, Marani W, Montemurro N, Perrini P. Microvascular decompression for trigeminal neuralgia due to vertebrobasilar artery compression: a systematic review and meta-analysis. *Neurosurg Rev*. 2022;45(1):285–294. doi:10.1007/s10143-021-01606-1
29. Ang L, Kim HJ, Heo JW, et al. Acupuncture for the treatment of trigeminal neuralgia: a systematic review and meta-analysis. *Complemen Therap Clin Prac*. 2023;52:101763. doi:10.1016/j.ctcp.2023.101763
30. Hu H, Chen L, Ma R, Gao H, Fang J. Acupuncture for primary trigeminal neuralgia: a systematic review and PRISMA-compliant meta-analysis. *Complemen Therap Clin Prac*. 2019;34:254–267. doi:10.1016/j.ctcp.2018.12.013
31. He HX, Li YX, Xiao YS, Fan WH, Xue H. The efficacy of acupuncture for trigeminal neuralgia: an overview of systematic reviews. *Front Neurol*. 2024;15:1375587. doi:10.3389/fneur.2024.1375587
32. Wang S, Wang J, Liu K, et al. Signaling interaction between facial and meningeal inputs of the trigeminal system mediates peripheral neurostimulation analgesia in a rat model of migraine. *Neuroscience*. 2020;433:184–199. doi:10.1016/j.neuroscience.2020.03.004
33. Yang L, Ding W, You Z, et al. Alleviation of trigeminal neuropathic pain by electroacupuncture: the role of hyperpolarization-activated cyclic nucleotide-gated channel protein expression in the Gasserian ganglion. *Acupunct Med*. 2019;37(3):192–198. doi:10.1177/0964528419841614
34. Zhang JF, Williams JP, Shi WR, et al. Potential molecular mechanisms of electroacupuncture with spatial learning and memory impairment induced by chronic pain on a rat model. *Pain Phys*. 2022;25(2):E271–e83.
35. Chen RW, Liu H, An JX, et al. Cognitive effects of electro-acupuncture and pregabalin in a trigeminal neuralgia rat model induced by cobra venom. *J Pain Res*. 2017;10:1887–1897. doi:10.2147/JPR.S140840
36. Goldman N, Chen M, Fujita T, et al. Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture. *Nat Neurosci*. 2010;13(7):883–888. doi:10.1038/nn.2562
37. Bayardo RJ, Agrawal R. Mining the most interesting rules. Proceedings of the fifth ACM SIGKDD international conference on Knowledge discovery and data mining; San Diego, California, USA: Association for Computing Machinery; 1999. p. 145–154.
38. Oyama T, Kitano K, Satou K, Ito T. Extraction of knowledge on protein-protein interaction by association rule discovery. *Bioinformatics*. 2002;18(5):705–714. doi:10.1093/bioinformatics/18.5.705
39. Reimer AP, Schiltz NK, Koroukian SM. High-risk diagnosis combinations in patients undergoing interhospital transfer: a retrospective observational study. *BMC Emerge Med*. 2022;22(1):187. doi:10.1186/s12873-022-00742-1
40. Paul S, Piontkivska H. Discovery of novel targets for multi-epitope vaccines: screening of HIV-1 genomes using association rule mining. *Retrovirology*. 2009;6(1):62. doi:10.1186/1742-4690-6-62
41. Zheng Y, Chen Y. The identification of Chinese herbal medicine combination association rule analysis based on an improved apriori algorithm in treating patients with COVID-19 disease. *J Healthcare Engine*. 2022;2022:6337082. doi:10.1155/2022/6337082
42. Oliveira MB, Ribeiro MP, Miguel SP, et al. In vivo high-content evaluation of three-dimensional scaffolds biocompatibility. *Tissue Engine Part C Methods*. 2014;20(11):851–864. doi:10.1089/ten.tec.2013.0738
43. Wang K, Wang M, Gan C, Voda MR. Diachronic perception of the impacts of ecological resettlement in a world heritage site. *Inter J Environ Res Public Health*. 2019;16(19).
44. Yang J, Teng Y, Song L, Zuo R. Tracing sources and contamination assessments of heavy metals in road and foliar dusts in a typical mining city, China. *PLoS One*. 2016;11(12):e0168528. doi:10.1371/journal.pone.0168528
45. Ching-Yi C, Fun Y, editors. Particle swarm optimization algorithm and its application to clustering analysis. IEEE International Conference on Networking, Sensing and Control. Taipei, Taiwan. 2004.
46. Zhao Z, Chen M, Fan H, Zhang N. Data analysis and knowledge mining of machine learning in soil corrosion factors of the pipeline safety. *Computat Intell Neurosci*. 2022;2022:9523878. doi:10.1155/2022/9523878
47. Pekel E. Estimation of soil moisture using decision tree regression. *Theoretic Appl Climatol*. 2020;139(3–4):1111–1119. doi:10.1007/s00704-019-03048-8