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Research article

Clinical rules of Acupoint selection for cancer pain opioid-induced constipation based on journal literature data mining: A systematic review

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ABSTRACT

Objective: To analyse and summarise the regularity of acupoint selection in the treatment of opioid-induced constipation (OIC) in patients with cancer pain using a data mining technique and provide a reference for clinical practice and more valuable treatment options.

Methods: The acupoint prescription database for the treatment of OIC-related cancer pain was established by searching the relevant literature on randomised controlled trials involving acupoint therapy for OIC-related cancer pain in seven major databases, including the China National Knowledge Infrastructure, Wanfang and VIP Chinese scientific journal databases, from database establishment to December 31, 2022. The main therapeutic measures of acupoint prescription, frequency of acupoint use and its subordinate meridians and subordinate sites were then analysed. Through systematic clustering and association rule analysis, the core acupoint prescriptions and most commonly used acupoint compatibility of acupoint therapy for OIC-related cancer pain were obtained.

Results: A total of 649 articles were retrieved, with 72 articles included after screening. The treatment measures were found to be mainly acupoint applications involving 28 acupoints, with a total frequency of 234. The three most frequently used acupoints were Shenque, Tianshu and Zusanli. The number of points used in the Foot-Yangming stomach meridian was the highest. Commonly used acupoints were mainly distributed in the abdomen. The compatibility of two commonly used acupoints was obtained through systematic clustering. Through association rule analysis, it was found that in the compatibility of acupoints, the strongest correlation was between Tianshu and Zusanli, and their frequency of application was the highest.

Conclusion: Tianshu and Zusanli are the core acupoints for acupoint therapy in the treatment of OIC-related cancer pain, and the Shangjuxu–Zhigou–Zusanli, Qihai–Guanyuan and Zhongwan–Tianshu acupoints exhibit the highest compatibility. This study provides a reference for the clinical acupoint selection programme of acupuncture and moxibustion in the treatment of OIC-related cancer pain.

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1. Introduction

The current standardised treatment for cancer pain often uses the 'three-ladder' analgesic regimen recommended by the World Health Organization [1]. As the main drugs for the treatment of cancer pain [2], opioids can effectively relieve pain; however, they can also cause constipation and other adverse reactions throughout the entire process of analgesic treatment [3]. This adverse effect not only reduces the quality of life of patients but also seriously interferes with the continuous use of opioid analgesics [4].

At present, studies show that the specific mechanisms of opioids in opioid-induced constipation (OIC) are as follows: 1) they act on the centre, inhibit intestinal nerve function and weaken gastrointestinal propulsion by affecting intestinal contractility [5]; and 2) they can bind to intestinal opioid receptors, inhibit peristalsis of the gastrointestinal tract and secretory function of the digestive glands, harden faeces and delay excretion [6]. Most patients must use laxatives (stimulant laxative ingredients + stool softeners) for prevention and treatment, based on nursing care, to change their dietary structure [7]. Traditional Chinese medicine (TCM) categorises OIC-related cancer pain as a 'constipation' disease; however, compared with patients with simple constipation, the pathogenesis of cancer pain in patients is more complex and largely based on virtual reality, meaning TCM treatment is primarily based on both the symptoms and root causes. Among the treatments, TCM acupoint therapy (mainly acupuncture, moxibustion, acupoint injection, acupoint application, acupressure and acupoint catgut embedding) is effective in improving cancer pain symptoms and is widely applied for its advantages of easy operation and fewer side effects.

In recent years, clinical trials using acupoint therapy in the treatment of OIC-related cancer pain have emerged, but there remains a lack of relevant acupoint selection rules. Studies have shown that stimulating acupoints can improve OIC issues in terms of constipation symptoms and quality of life [8,9]. Given that there is currently no universal acupoint selection standard, these studies have adopted different acupoints. Seeking stronger evidence and developing standardised acupoint selection standards can help to guide clinical treatment in this context and ensure greater efficacy. This study focuses on the rules of acupoint selection for OIC-related cancer pain.

Published studies involving randomised controlled trials on acupoint therapy in the treatment of OIC-related cancer pain were collated and analysed, and the regularity of clinical acupoint selection was summarised using a data mining system to provide a reference for acupoint selection and a more valuable treatment plan for clinical practice.

2. Materials and methods

2.1. Search methods

This is a retrospective study. Observation data studies on acupoint therapy for OIC-related cancer pain were searched for using the China National Knowledge Infrastructure, Wanfang Knowledge Service Platform, VIP, Sinomed, National Library of Medicine, Web of Science and Cochrane Library databases. The timeframe for the search ranged from the establishment of each database to December 31, 2022. The retrieval strategy included both themed and free words. The English search terms included the following: 'opioid-induced constipation', 'acupuncture', 'press needle', 'acupoint injection', 'acupoint application', 'acupressure' and 'acupoint catgut embedding' and their synonyms; the search using the Chinese databases included the Chinese words for the above terms.

2.2. Inclusion and exclusion criteria for literature screening

The inclusion criteria were as follows: (1) patients with OIC-related cancer pain without previous organic intestinal disease; (2) the intervention measures pertained to acupoint therapy, including acupuncture, electroacupuncture, fire needle, warm needle, press needle, acupoint injection, acupoint application and acupressure, and acupoint catgut embedding, which can be combined with other comprehensive therapies; (3) a complete acupoint treatment programme was required, and the efficacy of the intervention group was clearly reported; (4) the primary outcome measure of acupoint therapy in the treatment of cancer pain in patients with OIC was its clinical effectiveness rate, and the secondary outcome measures included the Karnofsky performance scale, patient status assessment of constipation, constipation symptom score, defecation difficulty score (the Clevelsky and constipation scales) and intestinal function index; (5) the study type was a clinical randomised controlled trial in Chinese or English; and(6)studys include acupoint therapy based on traditional Chinese medicine or western medicine, that can withdraw the curative effect of acupoint therapy.

The exclusion criteria included the following: (1) studies in newspapers, conference papers, dissertations, mechanistic studies, animal experiments, systematic reviews or meta-analyses and case reports; (2) repeated publications or cross-replicates in each database (counted as 1); (3) <30 cases in the intervention group; and (4) the study records were not clearly reported, and the evaluation criteria were not standardised.

The diagnostic criteria were as follows: (1) patients with a malignant tumour and cancer pain diagnosed by pathology; and (2) given the lack of a uniform standard for the diagnosis of OIC, according to clinical practice and relevant literature, the following was applied: a TCM diagnosis that referred to the *Diagnostic and Therapeutic Criteria for TCM Syndrome • Constipation* or the *Chinese Guidelines for the Diagnosis and Treatment of Chronic Constipation*, or a Western medicine diagnosis that referred to the *Rome IV Diagnostic Criteria for Functional Constipation* and the OIC criteria established by the American Multidisciplinary Working Group.

All the retrieved studies were screened based on the inclusion and exclusion criteria. If the two investigators disagreed about an article, a third investigator was asked to screen it. After obtaining the full text of the literature articles included in this study, data extraction was performed.

2.3. Data extraction and analysis

1.3.1 Data extraction and management. One investigator entered the title, author, publication date, number of cases, intervention measures and outcome indicators of the included articles into Microsoft Excel 2007 to establish an original database and standardise the names of meridians and acupoints concerning the *name and location of acupoints*. The second investigator then checked the input information for accuracy and completeness.

1.3.2 Risk assessment of data bias. The risk assessment will be use the Cochrane Collaboration's "Risk of bias" tool. The graphic representations of potential bias within and across studies using Rev Man V.5.3.5.

2.4. Extracted content

2.4.1. Primary outcome

Acupoints that therapeutic measures used are the primary outcome.

2.4.2. Secondary outcomes

Therapeutic measures involve acupoints.

2.5. Statistical analysis

Microsoft Excel 2007 was used to establish an acupoint prescription database for the treatment of OIC-related cancer pain, and the frequency of the main treatment measures, acupoint selection, and the subordinate meridians and subordinate sites of acupoint therapy were summarised and analysed. Systematic cluster analysis of high-frequency acupoints was performed using the 'Cluster' module in the SPSS Statistics 25.0 software; the clustering method was used for the links between groups, and squared Euclidean distance was applied as a measure of the distance between acupoints to obtain the compatibility of commonly used acupoints for acupoint therapy in the treatment of OIC-related cancer pain. The SPSS Modeler 18.0 analysis software package was used to analyse the association rules of prescription acupoints using the Apriori algorithm, with the points expressed in the form of A→B. Item set A indicated the 'antecedent item' and item set B indicated the 'result item'. Here, A→B support refers to how often item set A and item set B appear together in a transaction. Confidence of A→B refers to the conditional probability that item set A emerges in the presence of item set B. The support degree and confidence of acupoint collection were calculated to obtain the core acupoint prescription of acupoint therapy for OIC-related cancer pain, and the results were processed using a visual association network.

3. Results

3.1. Literature screening

A total of 649 relevant articles were retrieved from the literature search, with 512 articles obtained after removing duplicates using

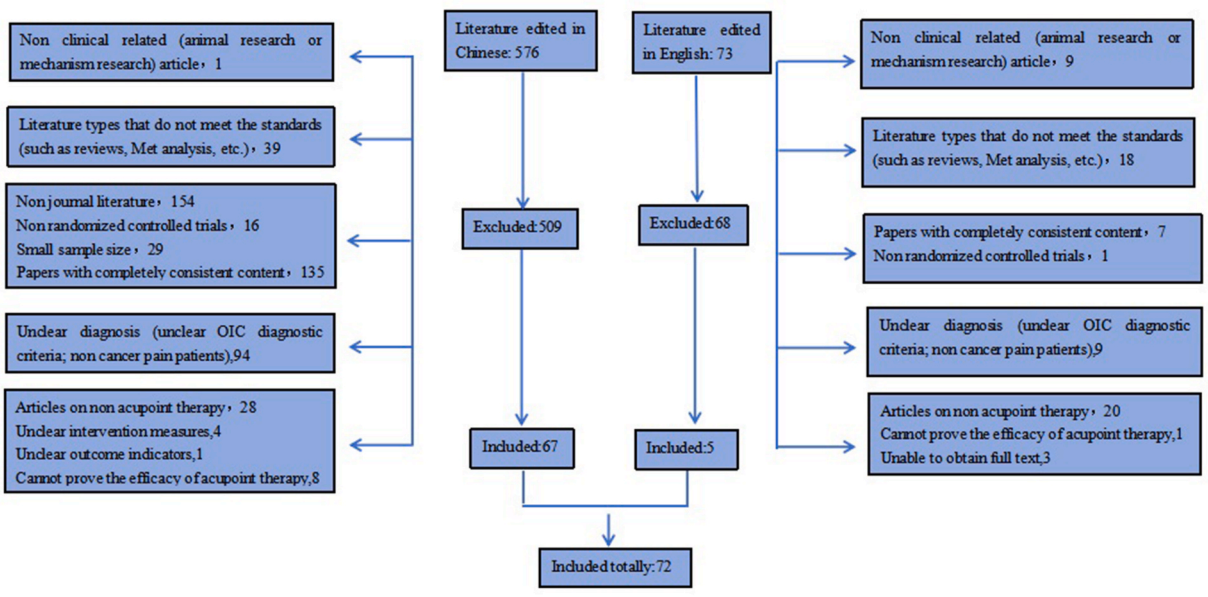

Fig. 1. Literature screening flowchart of acupoint therapy for cancer pain OIC.

Table 1
Characteristics of included literature.

Literature	Research type	Number of participants	Intervention measures	Evaluation plan
Xu2020 [10]	RCT	120	Acupuncture and moxibustion treatment (Da Jie Yu, Qi Hai, Guan Yuan, Zu San Li, and San Yin Jiao)	The Constipation Symptom Evaluation Form developed by the Chinese Medical Association in 2005
Liu2020 [11]	RCT	66	Acupoint application: Shenque	Number of spontaneous bowel movements per week
Lu2020 [12]	RCT	98	Acupoint application: Shenque	Number of spontaneous bowel movements per week
Han2020 [13]	RCT	70	Acupoint application: Shenque , Moxibustion treatment: Zusanli and Sanyinjiao	Symptom self-assessment scale for constipation patients
Lin2020 [14]	RCT	90	Acupuncture: Tianshu, Abdominal Node, Large Intestine Shu, Small Intestine Shu	Traditional Chinese Medicine Symptom Score Table (developed based on the Symptom Grading and Quantification Table in the Clinical Research Guidelines for New Chinese Medicines (Trial), PAC-QOL)
Li2020 [15]	RCT	90	Acupoint application: Shenque	Evaluation criteria for the efficacy of constipation based on the Diagnosis and Treatment Criteria of Traditional Chinese Medicine
Song2020 [16]	RCT	126	Ultrasonic:Tianshu	In reference to Criteria of clinical disease diagnosis and ther apeutic effect judgment
Guan2020 [17]	RCT	72	Acupoint application: Shenque	The incidence of constipation; Defecation situation
Gai2019 [18]	RCT	251	TENS combines traditional Chinese acupuncture 'Guanyuan' 'Qihai' 'Tianshu' 'Zusanli' 'Shangjuxu' points were selected.	Bowel Function Index (BFI).PAC-QOL , Criteria for scoring constipation symptoms and therapeutic effect evaluation.
Ma2019 [19]	RCT	72	Acupuncture: Zusanli, Hegu, Taichong, Zhigou, Shangjuxu	Clinical efficacy, difficulty in defecation, PAC-QOL
Wu2019 [20]	RCT	80	Massage: select Erming point, heart lung area, stomach spleen large intestine area for palm points, and kidney, bladder, anus, ureter and large intestine for foot points	Constipation symptom score scale
Tang2019 [21]	RCT	74	Acupoint application: Shenque	Constipation Scoring System (CS), Quality of Life Scale for Constipation Patients (PAC-QOL)
Zhu2019 [22]	RCT	70	Acupoint application: Shenque	The incidence of constipation; Constipation symptom score
Yang2019 [23]	RCT	62	Acupoint application: Shenque	Bowel function index , BFI; EORTCQLQC30 V3. 0
Tian2019 [24]	RCT	68	Massage: Zhongwan, Tianshu, Hegu, Guanyuan	Effectiveness
Zou2019 [25]	RCT	64	Acupuncture: Tianshu, Abdominal Node, Zhongwan, Large Intestine Shu, Small Intestine Shu	Patient Quality of Life (PAC-QOL) scale, Fecal Trait Rating Scale (Bristol), Score of defecation difficulty scale (CCS)
Lei2019 [26]	RCT	104	Acupoint application: Shenque	First bowel movement time , Bowel Function Index, BFI
Feng2019 [27]	RCT	60	Acupoint application: Shenque	Refer to the Diagnostic and Therapeutic Efficacy Standards for Traditional Chinese Medicine Diseases
Gong2018 [28]	RCT	146	Transcutaneous electrical stimulation: Guan Yuan, Qi Hai, Tian Shu, Zu San Li, Shang Juxu	**bowel fuction index** , BFI; PAC-QOL
Wu2018 [29]	RCT	68	Acupoint application: Shenque	Clinical effect
He2018 [30]	RCT	100	Acupuncture: Shenque, Tianshu, Zhongwan, Guilai, Shangjuxu, Xiajuxu	The defecation symptom score was evaluated using the "Constipation Symptoms and Efficacy Evaluation Questionnaire" developed by the Anorectal Surgery Group of the Chinese Medical Association's Surgery Branch
Li2018 [31]	RCT	86	Moxibustion: Tianshu point, Daheng point, Zhongwan point, Qihai point, Zusanli point	Self Rating Constipation Symptom Scale (PAC-SYM)
Zhang2018 [32]	RCT	76	Acupoint catgut embedding: Zusanli, Tianshu, Dachangyu, abdominal node	Refer to the Clinical Guidelines for Traditional Chinese Medicine Treatment of Constipation
Lv2018 [33]	RCT	64	Acupoint application: Shenque, acupoint massage: Tianshu acupoint, Qihai acupoint, Zhongwan acupoint	Clinical Symptom Score
Zhuo2017 [34]	RCT	60	Acupuncture: Baihui, Guanyuan, Qihai, Tianshu, Shangjuxu, Zusanli, Hegu, Taichong, Zhigou.	Develop a scoring table based on the 1994 National Administration of Traditional Chinese Medicine's Chinese Medicine Industry Standard for Diagnosis and Treatment of Traditional Chinese Medicine Diseases and the Constipation Rating Scale
Huang2017 [35]	RCT	60	Acupoint application: Shenque	Changes in clinical symptoms and signs before and after treatment; Clinical scores before and after treatment.

(*continued on next page*)

Table 1 (*continued*)

Literature	Research type	Number of participants	Intervention measures	Evaluation plan
Wang2017 [36]	RCT	152	Acupoint application: Shenque	Clinical efficacy, frequency of bowel movements per week, duration of each bowel movement, degree of difficulty in defecation, constipation score, adverse reactions, and quality of life.
Guo2017 [37]	RCT	120	Acupoint application: Shenque, Tianshu, Qihai, Guanyuan	The frequency of bowel movements, interval between bowel movements, and improvement of bowel quality; Develop efficacy evaluation criteria based on the Diagnosis and Treatment Efficacy Standards of Traditional Chinese Medicine
Yang2017 [38]	RCT	60	Ear acupoints: subcortical, brainstem, large intestine, spleen	Clinical effect
Wang2017 [39]	RCT	60	Acupuncture: Tianshu, Zusanli, Shangjuxu, Zhongwan, Quchi, Zhigou	Clinical effect
Yang2016 [40]	RCT	70	Acupoint application: Tianshu acupoint, Shenque acupoint	Clinical effect
Cao2016 [41]	RCT	86	Massage: Tian Shu and Da Jie Shu acupoints	Clinical effect
Lin2016 [42]	RCT	60	Acupoint application: Shenque	The incidence of constipation.
Liu2016 [43]	RCT	76	Acupoint application: Shenque	Clinical effect
Wang2016 [44]	RCT	61	Acupoint application: Shenque ， Zusanli	Evaluate the therapeutic effect of constipation according to the Diagnosis and Treatment Criteria for Traditional Chinese Medicine Diseases
Fan2016 [45]	RCT	80	Acupoint application: Shenque	The efficacy evaluation criteria are formulated in accordance with the Guiding Principles for Clinical Research of New Chinese Medicines
Jin2016 [46]	RCT	60	Acupoint application: Shenque	Total effective rate, symptom score, constipation relief time, quality of life
Wang2016 [47]	RCT	84	Acupoint application: Shenque	Constipation Scale (CCS), Health Survey Brief (SF-36)
Zang2015 [48]	RCT	60	Acupoint application: Shenque, Zhongwan, Tianshu, Daheng, Guanyuan acupoints	Constipation symptom score
Xu2015 [49]	RCT	88	Massage: Zhigou, Hegu, Tianshu, Zhongwan, Zusanli, Sanyinjiao	Constipation Symptoms and Efficacy Evaluation Questionnaire compiled by the Anorectal Surgery Group of the Chinese Medical Association's Surgery Branch
Lin2014 [50]	RCT	82	Acupoint application: Shenque	Refer to the evaluation criteria for the efficacy of constipation in the Diagnosis and Treatment Criteria of Traditional Chinese Medicine.
Zheng2014 [51]	RCT	60	Ear acupoints: Constipation point, triple focus, abdomen, stomach, liver, sympathetic, large intestine, subcortical	According to the Diagnostic and Therapeutic Efficacy Standards for Traditional Chinese Medicine Diseases
Li2014 [52]	RCT	60	Acupoint application: Shenque, Zhongwan, Tianshu, Daheng, Guanyuan acupoints	Constipation symptom score
Liu2014 [53]	RCT	80	Ear acupoints: Select the main acupoints for the stomach, large intestine, small intestine, triple jiao, endocrine, and constipation points, and match the acupoints for the spleen, kidney, sympathetic, liver, adrenal, ear tip, etc. Choose 2–3 main acupoints and 1–2 matching acupoints	Clinical effect
Fu2013 [54]	RCT	80	Acupoint application: Tian Shu, Da Shu, Zhi Gou, Da Heng	According to the efficacy evaluation criteria of the Clinical Research Guidelines for the Treatment of Constipation with New Chinese Medicine Drugs
Xu2013 [55]	RCT	72	Acupuncture: Tian Shu, Da Jie Shu, Shang Ju Xu, Zhi Gou, Zhao Hai	Clinical effect
Zhao2012 [56]	RCT	60	Moxibustion: Tianshu, Guanyuan	Develop evaluation criteria based on the Diagnosis and Efficacy Standards for Traditional Chinese Medicine Diseases
Qin2010 [57]	RCT	100	Acupoint injection: San Li, Da Jie Shu, Tian Shu	Develop evaluation criteria based on the Diagnosis and Efficacy Standards for Traditional Chinese Medicine Diseases
Jiang2010 [58]	RCT	60	Acupuncture: Zhigou, Shangjuxu, Zusanli, Sanyinjiao, Qihai acupoints.	Clinical symptom score is based on the 2002 edition of the Guiding Principles for Clinical Research of New Chinese Medicine Drugs
Zhang2009 [59]	RCT	66	Electroacupuncture: Tianshu, Zusanli	Develop efficacy evaluation standards based on the Guiding Principles for Clinical Research of New Chinese Medicine Drugs
Yang2008 [60]	RCT	120	Acupoint application: Shenque	Referring to the relevant standards of the Guiding Principles for Clinical Research of New Chinese Medicines

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Table 1 (*continued*)

Literature	Research type	Number of participants	Intervention measures	Evaluation plan
Xu2016 [61]	RCT	78	Massage	Clinical effect
Yang2018 [62]	RCT	100	Acupoint massage: Hegu, Tianshu, Daheng, Zhongwan, Zusanli, Sanyinjiao	Clinical effect
Wei2020 [63]	RCT	62	Acupoint application: Shenque	Clinical effect
Ding2014 [64]	RCT	82	Acupuncture: Tianshu and Zhigou acupoints	Develop evaluation standards based on the Traditional Chinese Medicine Industry Standards
Shen2017 [65]	RCT	95	Acupoint application: Shenque	Evaluate the therapeutic effect according to the Diagnosis and Treatment Criteria for Traditional Chinese Medicine Diseases
Li2015 [66]	RCT	64	Acupoint application: Shenque	Develop efficacy evaluation standards based on the Guiding Principles for Clinical Research of New Chinese Medicines
Wen2012 [67]	RCT	60	Acupoint application: Shenque, Yongquan	Constipation score (CS)
Yin2018 [68]	RCT	86	Acupoint application: Shenque	Clinical effect
Zhu2018 [69]	RCT	198	acupoint interferential current：tianshu，zhongwan	Cleveland Constipation Scale18(CCS); The Patient Assessment of Constipation Quality of Life (PAC-QoL)
Yildirim2022 [70]	RCT	140	acupressure：Zhongwan , Guanyuan, and Tianshu	PAC-QOL
He2021 [71]	RCT	171	Transcutaneous electrical nerve stimulation (TENS)：Ganshu，Danshu，Pishu	NRS
Chen2022 [72]	RCT	96	Acupoint massage: Tian Shu, Da Jie Shu, Shang Ju Xu, Guan Yuan, Pi Shu, Zhi Gou, Zhao Hai	CSEES
Yao2022 [73]	RCT	100	Acupoint application: Shenque, moxibustion: Tianshu, Zhigou, Zusanli, Shangjuxu	Develop evaluation standards based on the Guiding Principles for Clinical Research of New Chinese Medicines
Shi2022 [74]	RCT	60	Acupoint application: Tian Shu, Da Jie Shu, and Shen Que acupoints	Evaluate clinical efficacy based on the consensus of experts in traditional Chinese medicine diagnosis and treatment of constipation (2017)
Wu2021 [75]	RCT	86	Acupoint application: Shenque	Patient Bristol Fecal Trait Score, Bowel Function Index (BFI), Constipation Patient Quality of Life Scale Score, Serum Inflammatory Factors [Motilin (MTL), Substance P (SP), Somatostatin (SS), Vasoactive Intestinal Peptide (VIP)]
Zhao2021 [76]	RCT	80	Acupoint application: Shenque	Rome III standard for constipation, intestinal function index (BFI), constipation symptom score
Qi2021 [77]	RCT	70	Acupoint application: Tian Shu, Gui Lai, Da Jie Shu, Zhi Gou, Shang Ju Xu	BSFS score, CCS score
Yang2021 [78]	RCT	60	Acupuncture: Kongzui, Taichong, Siguan, Zusanli, Neiguan	NRS
Ma2022 [79]	RCT	82	Acupoint application: Shenque	Constipation Symptom Rating Scale, Quality of Life Rating Scale
Zhu2020 [80]	RCT	80	Moxibustion: Tian Shu, Da Jie Shu, Ci Liao, Shang Ju Xu, Acupuncture: Tian Shu, Da Jie Shu, Shang Ju Xu, Zhi Gou, Zhao Hai	KPS score, NRS score, CCS score, PAC-QOL score
Tian2020 [81]	RCT	70	Acupuncture: Tianshu, Shangjuxu, Zusanli, Hegu, Dachangshu, Pishu, Zhigou.	PAC-QOL score, Constipation CCS score

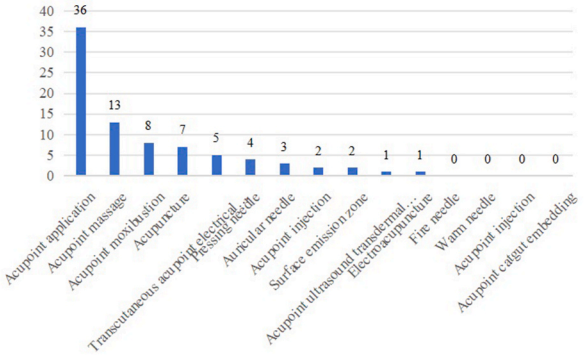


Fig. 2. Analysis of therapeutic measures of acupoint therapy for cancer pain OIC.

Endnote X9 software. Screening was performed in strict accordance with the inclusion and exclusion criteria, and 72 articles were finally included [10–81]. A flowchart of the literature screening process is shown in Fig. 1.The characteristics of included research are shown in Table 1.

3.2. Descriptive analysis

3.2.1. Analysis of treatment measures

The statistical analysis showed that acupoint application had the highest frequency, followed by acupressure, acupuncture and acupoint moxibustion (Fig. 2). The statistics indicated that the number of relevant research studies on various treatment measures involving acupoints in the treatment of OIC-related cancer pain was generally small. This study thus unifies the measures under 'acupoint therapy' and summarises and analyses their acupoints.

3.2.2. Frequency analysis of acupoints

The acupoint prescriptions of 72 studies were analysed for the frequency of acupoint use, involving 28 acupoints with a total frequency of 234. A total of nine acupoints were used more than eight times, including, in descending order of frequency, Tianshu, Shenque, Zusanli, Zhongwan, Guanyuan, Zhigou, Shangjuxu, Dachangshu and Qihai. The cumulative application frequency of the above nine acupoints was 81.2%, making them high-frequency application acupoints (Table 2).

3.2.3. Meridian frequency analysis

The 28 acupoints used in the included studies involved the Foot-Yangming stomach meridian, Foot-Taiyin spleen meridian, Foot-Taiyang bladder meridian, Foot-Shaoyin kidney meridian, Foot-Jueyin liver meridian, Hand-Yangming large intestine meridian, Hand-Shaoyang triple jiao meridian, Ren meridian and Du meridian. The application frequency of the Ren meridian and Foot-Yangming stomach meridian was >50, and the cumulative application frequency of the above two meridians reached 67.1%. The number of points used in the Foot-Yangming stomach meridian was the highest (Tables 3 and 4).

3.2.4. Frequency analysis of acupoint division

Acupoints involve the head, upper limbs, lower limbs, chest and abdomen, lower back and feet. By summarising the distribution of acupoints, this study found that the highest number of acupoints used for acupoint therapy in the treatment of OIC-related cancer pain, as well as the frequency of acupoint application, are mainly concentrated in the chest and abdomen (Fig. 3).

3.3. Cluster analysis

To systematically cluster the acupoints with more than eight applications, the SPSS Statistics 25.0 software was used to create a column diagram and dendrogram of acupoints. Taking cluster number 5 as an example, three effective clusters were observed in chart 4: Shangjuxu–Zhigou–Zusanli, Qihai–Guanyuan and Zhongwan–Tianshu (Fig. 4). The acupoints in the dendrogram can generally be divided into two categories, the first of which is Shenque. The second category can also be divided into three groups, with the first group including Shangjuxu, Zhigou and Zusanli, the second including Qihai and Guanyuan and the third including Zhongwan and Tianshu (Fig. 5).

3.4. Association rule analysis

The Apriori algorithm of the SPSS Modeler 18.0 software was used to analyse the association rules for acupoints with a frequency ≥2 and to construct association rule reticulation maps. The thicker lines in the graph indicate a stronger correlation. Here, Tianshu–Zusanli had the strongest correlation (Fig. 6). In the acupoint compatibility analysis, the lower limit of strong links was set to 8 (i.e. the frequency of acupoint compatibility application was ≥8), and five groups of high-frequency acupoint compatibility combinations were obtained, among which Tianshu–Zusanli had the highest frequency of application (Table 5). The support degree (the probability of the front item and back item appearing at the same time) and confidence (the probability that when the current item appeared, the back item also appeared) were set as 10.0% and 80.0%, respectively, and a total of 14 high-frequency acupoint combinations groups

Table 2
Frequency of acupoint therapy for cancer pain OIC high-frequency acupoints.

Acupoints Name	Times	Frequency/%	Cumulative Frequency/%
Tianshu	43	22.6	18.4
Shenque	35	18.4	33.3
Zusanli	22	11.6	42.7
Zhongwan	19	10	50.9
Guanyuan	16	8.4	57.7
Zhigou	15	7.8	64.1
Shangjuxu	14	7.3	70.1
Dachangshu	13	6.8	75.6
Qihai	13	6.8	81.2

Table 3
Acupoint therapy for cancer pain OIC meridian, number and frequency.

Meridians	Times of acupoints	Frequency of acupoints	Number of acupoints
Ren Mai	86	41.1	4
Stomach Meridian of Foot-Yangming	71	34.0	7
Spleen meridian of foot Taiyin			
Bladder Meridian of Foot-Taiyang	17	8.1	3
Shaoyang triple energizer meridian of hand	20	9.6	5

Table 4
Acupoint therapy for cancer pain OIC acupoints meridian, number and frequency.

Meridians	Number of acupoints	Name and frequency of acupoints
Stomach Meridian of Foot-Yangming	6	Tianshu (43), Zusanli (22), Shangjuxu (14), Returning (2), Xiajuxu (1), Neiting (1), Fenglong (1)
Bladder Meridian of Foot-Taiyang	5	Large intestine shu (13), small intestine shu (2), spleen shu (2), secondary liao (2), kidney shu (1)
Ren Mai	4	Shenque (35), Zhongwan (19), Guanyuan (16), Qihai (13)
Spleen meridian of foot Taiyin	3	Da Heng (8), San Yin Jiao (6), Abdominal Node (3)
Hand-Yangming Large Intestine Meridian	2	Hegu (6), Quchi (1)
Foot Shaoyin Kidney Meridian	2	Yongquan (1), Zhaohai (3)
Shaoyang triple energizer meridian of hand	1	Zhigou (15)
Du meridian	1	Baihui (2)
Foot-Jueyin Liver Meridian	1	Taichong (2)
Hand Taiyin Lung Meridian	1	Kongzui(1)

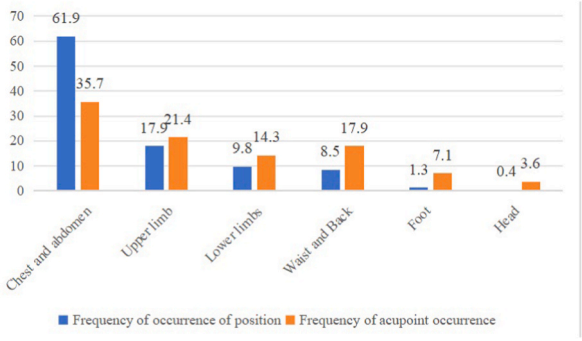


Fig. 3. Analysis of acupoints in treating cancer pain OIC with acupoint therapy.

were obtained. Among them, Zhongwan→Tianshu had the highest support, and the frequency of these two simultaneous occurrences was 22.642%, whereas Daheng→Tianshu and Sanyinjiao→Zusanli had the highest confidence (both 100.0%); that is, the probability of Tianshu appearing when Daheng appeared and the probability of Zusanli appearing when Sanyinjiao appeared was 100.0% (Table 6).

3.5. Risk assessment of data bias

Most studies only mention the use of random number tables for grouping, and do not mention whether it is an open random number table or hidden allocation; Due to the particularity of acupoint therapy, it is also not possible to achieve double blindness between participants and implementers; None of the studies mentioned blinding of outcome assessment; Most studies were well done in incomplete outcomge data and selective reporting; Other biases mainly focus on the absence of sham treatment. See Figs. 7 and 8.

4. Discussion

In TCM, it is believed that opioids have a similar effect to that of the application of the poppy plant, which has a pungent and warm nature and easily disperses qi but can also injure body fluid and induce blood loss in addition to analgesia [82]. In addition, the warm and dry evil of opioids can also present as cementation with pathological factors or pathological products such as phlegm turbidity, blood stasis and toxic pathogens in patients with cancer pain, indicating mixed efficiency [83]. Accordingly, OIC is associated with

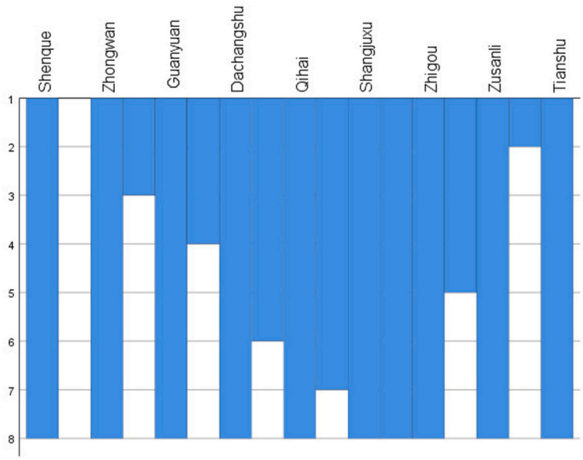


Fig. 4. High frequency acupoint clustering column diagram.

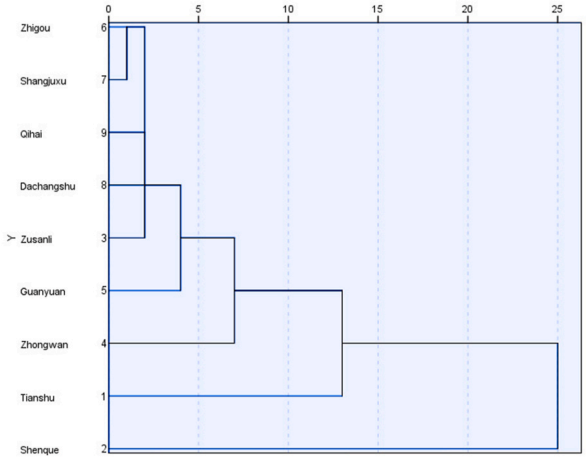


Fig. 5. High frequency acupoint clustering dendrogram.

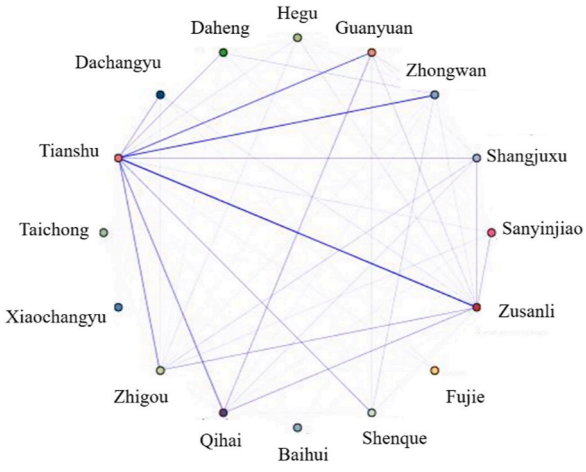


Fig. 6. Association rule reticulation diagram.

Table 5
Combination of high frequency acupoints in acupoint therapy for cancer pain OIC.

High frequency acupoint compatibility combination	Frequency(%)
Tianshu-Zusanli	12 (23.5%)
Tianshu-Zhongwan	11(21.6%)
Guanyuan-Tianshu	10 (19.6%)
Qihai-Tianhu	9 (17.6%)
Tianshu-Zhigou	9 (17.6%)

Table 6
Association rules analysis of acupoint therapy for cancer pain OIC acupoints.

Frequent itemsets	Percent Support	Percent Confidence
Daheng→Tianshu	11.321	100.0
Sanyinjiao→Zusanli	11.321	100.0
Zhongwan→Tianshu	22.642	91.667
Guanyuan→Tianshu	20.755	90.909
Qihai→Tianshu	18.868	90.0
Zhigou→Tianshu	18.868	90.0
Dachangyu→Tianshu	15.094	87.5
Shangjuxu→Tianshu	15.094	87.5
Qihai、Guanyuan→Tianshu	13.208	85.714
Qihai、Zusanli→Tianshu	13.208	85.714
Zhigou、Zusanli→Tianshu	13.208	85.714
Daheng→Zhongwan	11.321	83.333
Daheng、Tianshu→Zhongwan	11.321	83.333
Shangjuxu、Zusanli→Tianshu	11.321	83.333

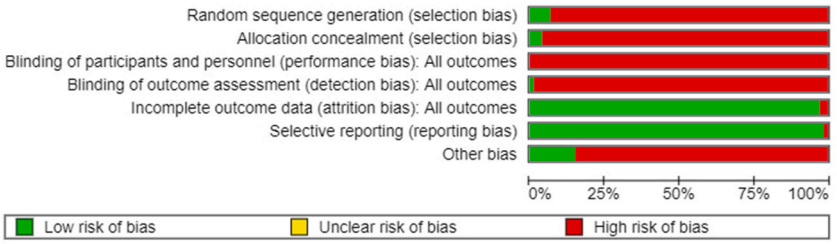
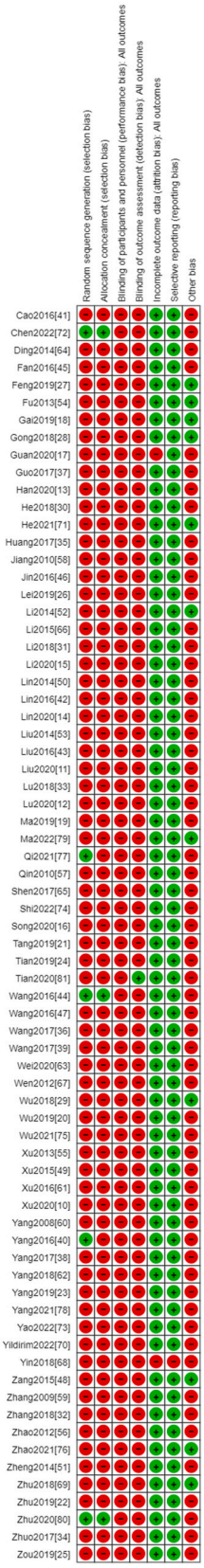


Fig. 7. The overall risk bias of the included evidence.

exogenous opioids, internal injuries in deficiency and disease locations in the gastrointestinal tract and multiple visceral systems [84]. Treatment in these instances includes correcting and eliminating pathogenic factors for the protection of the spleen and stomach and to ensure smooth qi.

This study conducted a comprehensive investigation and summarised the usage patterns of acupoints through a literature review including 72 studies. It explored the frequency of use of acupoints, meridians and areas of the body, as well as the rules of acupoint combinations. A total of 72 randomised controlled trial studies involving acupoint therapy for OIC-related cancer pain were included in this review. By integrating the existing data, the findings showed that specific acupoint therapy measures for OIC-related cancer pain primarily included acupoint applications. An analysis of the meridians revealed that the highest number of points was used in the Foot-Yangming meridian of the stomach. The analysis of the acupoint branches revealed that the acupoints were mainly concentrated in the chest and abdomen. Twenty-eight acupoints were involved in acupoint selection, and the three most frequently used were Shenque (35 times), Tianshu (43 times) and Zusanli (22 times). Shenque is an important point of Ren Mai. Modern medicine posits that the umbilical skin is thin and tender and that the surrounding nerves and blood vessels are densely covered, indicating that it has high sensitivity [85]. Therefore, Shenque is selected to regulate the spleen and stomach and make the Bai Mai smooth. Zusanli is the combined point of the five points of the Foot-Yangming stomach meridian and is also selected to regulate the spleen and stomach. Tianshu is the hub of the rise and fall of the human body's qi and is selected to dredge the large intestine fu qi.

Systematic clustering was performed using the SPSS Statistics 25.0 software. According to the column diagram and dendrogram of acupoints, the clinical acupoints can mainly be divided into the following two categories: 1) the Shenque type, which is widely used in acupoint application for the treatment of OIC-related cancer pain; and 2) the three main compatibility points of Shangjuxu–Zhigou–Zusanli, Qihai–Guanyuan and Zhongwan–Tianshu. In view of patients with OIC-related cancer pain, which is mostly based on the virtual scale of the disease, these three groups of acupoint compatibility in the treatment of each emphasis. Among them, Qihai–Guanyuan Peiyuan consolidates the root, mainly in terms of tonifying; Zhongwan–Tianshu regulates fu qi, again, mainly in terms of tonifying; and Tianshu and Zhongwan can effectively improve OIC symptoms and quality of life [86].



(caption on next page)

Fig. 8. Specific risk bias of 72 included evidences.

Shangjuxu–Zhigou–Zusanli is a triple energiser meridian point, which can regulate triple energiser qi. Choose Shangjuxu can defecate. Zusanli is the lower point of the stomach and can invigorate the spleen and stomach, as well as replenish the qi and blood. Zusanli and Shangjuxu can improve constipation symptoms [87], whereas Zhigou can cause functional constipation and is frequently used [88]. The combination of these three groups can produce improved therapeutic results.

Using SPSS Modeler 18.0 analysis software to construct association rule reticulograms, this study found that Tianshu–Zusanli had the strongest correlation and was most frequently applied. The Tianshu and Zusanli points can be regarded as core points for acupoint therapy in the treatment of OIC-related cancer pain [89]. The frequency of Tianshu in the prescription of Daheng and Zusanli and in the prescription of Sanyinjiao was 100%. The large transverse is the intersection point between the Foot-Taiyin spleen meridian and Yin Wei meridian, which can invigorate the spleen and regulate qi stagnation in Tianshu. The combination of the two is used to regulate the stomach and intestines. Sanyinjiao is the intersection point of the Foot-Taiyin spleen meridian, Foot-Shaoyin kidney meridian and Foot-Jueyin liver meridian [90].

This study summarises the frequency of acupoint use for treating OIC and provides a strong reference for developing acupoint selection standards. However, the study also has some limitations. First, the number of included studies is small, and the conclusions that were drawn lack generalisability. Second, this study lacks content related to acupoint massage, which may have led to insufficient research inclusion and biased results. Thirdly, the lack of high-quality literature can also lead to biased results. Finally, acupoint prescription analysis was not performed in terms of specific treatments related to acupoint therapy. We will continue to focus on the relevant clinical literature and integrate, further verify and improve the acupoint selection rules of acupoint therapy in the treatment of OIC-related cancer pain, providing a further reference for a future acupoint selection programme of acupoint therapy in the treatment of OIC-related cancer pain.

5. Conclusion

In this study, data mining was used to summarise the clinical acupoint selection characteristics of acupoint therapy in the treatment of OIC-related cancer pain. Tianshu, Zhongwan and Zusanli had the strongest correlation and highest frequency of use and were used as core acupoints. Shangjuxu–Zhigou–Zusanli, Qihai–Guanyuan and Zhongwan–Tianshu were used as the main combinations to invigorate the spleen, nourish the stomach and allow for respectively. The results are consistent with clinical practice, can guide clinical decision-making and are of great significance for the clinical standardisation of acupuncture and moxibustion.

WHO Standard Acupuncture Point Locations.
Zusanli (stomach meridian, ST 36).
Tianshu (stomach meridian, ST 25).
Zhongan (conception vessel, CV 12).
Shenque (conception vessel, CV 8).
Qihai (conception vessel, CV 6).
Guanyuan (conception vessel, CV 4).
Shangjuxu (stomach meridian, ST 37).
Zhigou (triple energizer meridian, TE 6).

Dissemination and ethics

The results of this review will be disseminated through peer-reviewed publications. No ethical approval is required for this review, as all data used in this review and meta-analysis have already been published. In addition, all this data will be analysed anonymously during the review process.

Availability of data and materials

Data associated with this study has not been deposited into a publicly available repository. All data included in article.

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CRediT authorship contribution statement

Yuan Xie: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Yuanyuan Li:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Di Liu:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Yi Zou:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Haiying Wang:** Writing – review & editing, Writing – original draft, Investigation,

Formal analysis, Data curation. **Liang Pan:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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