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Examining the Features of Traditional Medicine Shoulder Pain (Jian Tong) in Early Rehabilitation Patients Following Ischemic Stroke

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ABSTRACT

Ischaemic stroke frequently results in long-term complications that disrupt patients' functional capacity and overall quality of life, with shoulder pain being among the most prominent and disabling sequelae. This type of pain typically manifests within the first 3 months following the cerebrovascular event, with reported rates varying from 25% to 72%. During this early stage—marked by heightened neuroplastic activity—post-stroke shoulder pain can hinder motor recovery, prolong hospitalization, contribute to depressive symptoms, restrict movement, and negatively influence treatment outcomes. In Vietnam, Traditional Medicine (TM) has long served as a foundational approach for addressing post-stroke shoulder pain. However, the literature describing the Traditional Medicine pathology and symptom patterns of Jian Tong after stroke remains insufficient. Consequently, the objective of this study was to assess the severity and symptom characteristics of Jian Tong in individuals experiencing shoulder pain after ischaemic stroke. This investigation was carried out from January 1, 2023, to May 1, 2023, and consisted of two sequential stages. Phase 1 involved an extensive review of TM literature, from which 17 Jian Tong features were extracted and coded to construct the questionnaire used in Phase 2. Phase 2 employed a cross-sectional design to document the Traditional Medicine characteristics of Jian Tong among 65 early-rehabilitation patients recovering from ischaemic stroke. During the first phase, 17 Jian Tong characteristics were identified from 10 classical and modern TM sources. In the second phase, findings from 65 surveyed patients showed that pain aggravated by exertion was the most prevalent feature, while symptoms such as cold-relieved pain and shoulder distension were observed least frequently. Both Numerical Rating Scale (NRS) pain scores and gender exhibited statistically significant associations with Traditional Medicine Jian Tong characteristics ($p < 0.05$). This work outlines the severity and symptom profile of Jian Tong in individuals with ischaemic stroke during early rehabilitation, offering valuable insight to support individualized Traditional Medicine–based diagnostic reasoning and therapeutic planning for post-stroke shoulder pain.
Keywords: Jian tong, Shoulder pain, Traditional medicine, Numerical rating scale, Ischaemic stroke

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Introduction

Stroke ranked as the second leading cause of global mortality in 2019, accounting for 162,890 deaths [1], and in Vietnam alone, roughly 200,000 new cases occur annually [2]. Ischaemic stroke, responsible for 87% of all stroke presentations according to the American Heart Association [3, 4], arises when cerebral blood flow is obstructed, resulting in neuronal injury and cognitive dysfunction. Even after the acute stage subsides, individuals frequently endure persistent impairments that compromise daily functioning and quality of life [5]. A 2019 study by Sophie B. *et al*. identified pain—particularly shoulder pain—as one of the most frequent complaints after stroke [5]. This condition commonly emerges within 2–3 months following the event, with a prevalence ranging between 25% and 72%, and is known to impede motor recovery, increase hospitalization duration, contribute to depressive symptoms, limit mobility, and reduce therapeutic effectiveness [6, 7]. Therefore, a clear delineation of early post-stroke shoulder pain symptoms is essential for facilitating appropriate care and minimizing the long-term burden of disability.

In Traditional Medicine, shoulder pain has historically been classified under the bi zheng category, as described in the Yellow Emperor's Classic of Internal Medicine. Subsequent classical texts—including The Systematic Classic of Acupuncture and Moxibustion—expanded upon this description using terms such as "jian bei bi tong," "jian bi tong," and "jian bi," though "Jian Tong" remains the most widely adopted term [8]. With the advancement of healthcare systems, TM continues to play an important role in supporting modern therapeutic strategies for shoulder pain after stroke [9–11]. Clinical evidence underscores this contribution: in 2018, Yang C. reported that acupuncture at the Tiaokou (ST38) acupoint produced significant clinical benefits by improving Constant–Murley scores and reducing VAS pain intensity [10]. Similarly, Zhang L. (2021) demonstrated that Wenjing Tongluo Decoction combined with paroxetine effectively lowered pain levels while enhancing upper-limb function and self-care capacity in stroke patients [11]. Another investigation by Ren M. (2022) confirmed that TM interventions—such as acupuncture and massage—when integrated with rehabilitation protocols, markedly alleviated hemiplegic shoulder pain and improved mobility [9]. To appropriately implement TM-based therapies, practitioners must accurately recognize the syndrome patterns and defining features of Jian Tong within a TM diagnostic framework [12]. Comprehensive knowledge of these characteristics is therefore essential.

Although research in China, such as the study by Wang Y. *et al*. (2021), has categorized TM syndromes associated with shoulder and neck pain into four groups—Qi and Blood Deficiency, Damp-Heat, Wind-Cold-Dampness, and Blood Stasis [13]—Vietnamese investigations into post-stroke shoulder pain from a TM perspective remain scarce. This shortage highlights the need to systematically examine the Traditional Medicine attributes of Jian Tong to strengthen clinical decision-making and serve as a foundation for future research.

The present study focused on patients within the early rehabilitation window (24 hours–3 months post-stroke), a critical period characterized by heightened neurophysiological recovery and maximal natural plasticity [14, 15]. Beyond this stage, a "ceiling effect" may develop, making functional gains more difficult to evaluate [15]. This timeframe also corresponds with the typical onset of post-stroke shoulder pain, often resulting from muscle weakness, joint misalignment, excessive strain, improper caregiving practices, increased tone, or spasticity [16].

Materials and Methods

Study setting and participants

Two-phase study design

Phase 1: This phase employed a descriptive research approach, drawing upon Traditional Medicine (TM) documents that fulfilled predetermined criteria. Eligible sources included textbooks from TM departments of national and international medical universities, foundational classical TM works, and specialized TM monographs authored by experienced galenic physicians or Associate Professor–Doctor of Philosophy–level experts with more than two decades of clinical TM practice [17, 18]. All selected textbooks and monographs had undergone review and approval by relevant academic appraisal councils in Vietnam. After extracting and compiling the TM characteristics related to Jian Tong, these features were statistically summarized and systematically coded into variables, which were subsequently used to construct the Phase 2 questionnaire [18] **(Figure 1)**.

Phase 2: The second phase consisted of a cross-sectional survey involving 65 individuals diagnosed with ischaemic stroke during the early rehabilitation window. These patients, receiving either inpatient or outpatient care between January and April 2023, were recruited from two medical facilities: Ho Chi Minh City Hospital of Traditional Medicine and Ho Chi Minh City Hospital for Rehabilitation – Professional Diseases **(Figure 1)**.

Inclusion criteria

Participants were required to satisfy all of the following conditions:

- Age ≥ 18 years;
- Diagnosed with ischaemic stroke according to the Ministry of Health of Vietnam guidelines or based on medical records/discharge documents;
- Recent onset of shoulder pain, with no prior interventions for shoulder pain documented in the medical chart;
- Cognitively intact and able to cooperate during data collection;
- Within 24 hours to 3 months post-stroke, corresponding to the early rehabilitation period;
- Willing to participate voluntarily.

Exclusion criteria

- Individuals exhibiting cognitive impairment, psychiatric disease, or dementia that hindered effective communication (assessed with MMSE);
- Patients unable to finish the questionnaire for any reason [19].

Withdrawal criteria

- Participants who decided to discontinue their involvement;
- Patients whose health deteriorated to a degree that made further participation unsafe or impracticable.

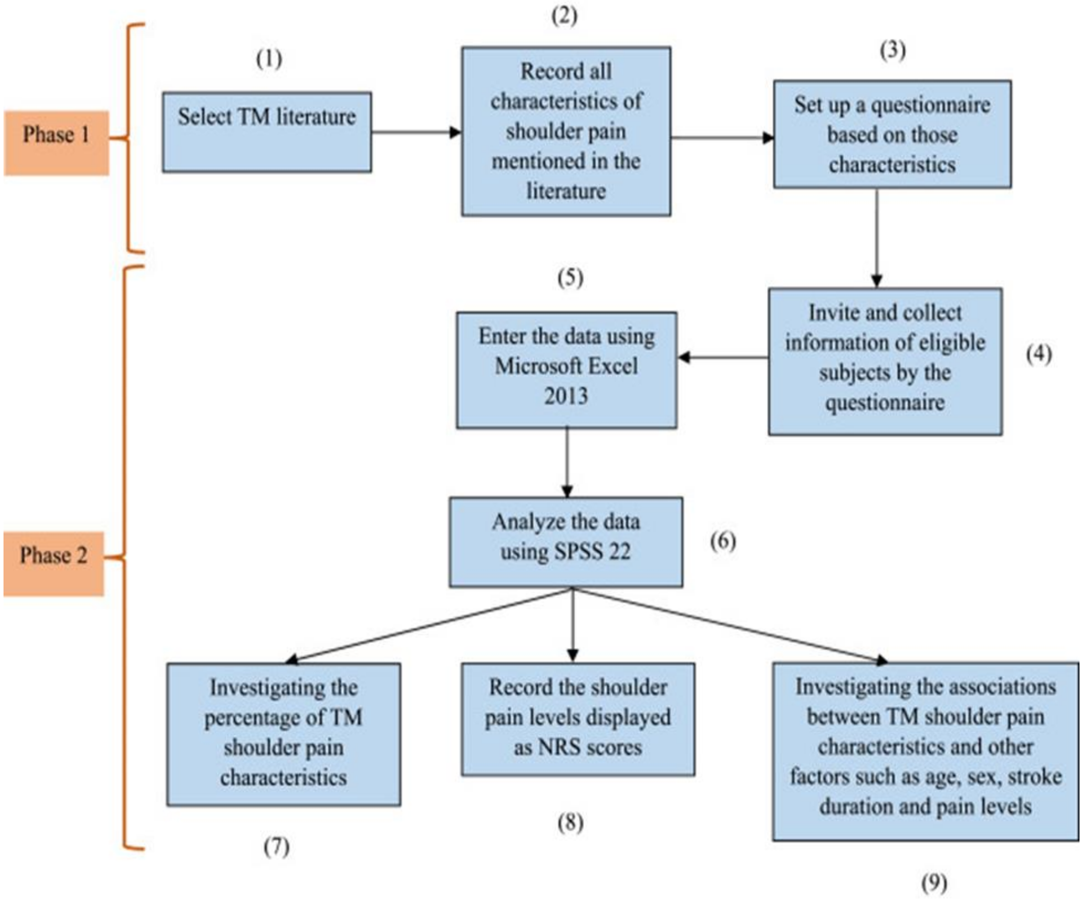

Figure 1. Two phases of study.

Sample size

Using the formula:

$$n = Z^2_{(1-\frac{\alpha}{2})} \cdot \frac{p(1-p)}{d^2} \qquad (1)$$

With $\boldsymbol{\alpha}$: Type I Error, $\boldsymbol{\alpha}$ = 0,05.

Z: Standard normal distribution value, $Z_{0,975}$ = 1,96 with the reliability of 95%.

p: The prevalence of ischaemic stroke, p = 0,0443 [20].

d: Tolerable error, d = 0,05.

The study determined that the minimum required sample size was n≥65, and a total of 65 patients were ultimately surveyed.

Data collection

Phase 1: Literature sources were gathered from faculty libraries, university libraries, and electronic repositories. In this study, the primary document databases consulted were three major national collections:

- Library of the University of Medicine and Pharmacy at Ho Chi Minh City
- General Sciences Library of Ho Chi Minh City

- National Library of Vietnam

Each selected text meeting the eligibility criteria was examined to identify content related to the Jian Tong topic unit or its equivalent terms—such as "jian bei bi tong," "jian bi tong," or "jian bi." All Jian Tong characteristics found in the documents were extracted, duplicate items were eliminated, and their appearance frequencies were catalogued. These characteristics were then converted into coded variables to streamline data storage and to develop the questionnaire utilized in Phase 2.

Reliability and validity of the questionnaire items targeting Jian Tong characteristics underwent expert appraisal. According to established standards, experts were defined as "individuals who possess professional experience or scholarly work within the field" [21], typically demonstrated through published research, academic contributions, or a long duration of involvement in Traditional Medicine. Our panel included five experts—within the recommended range of 3–10 evaluators [21, 22]—all of whom held at least a Master's degree in Traditional Medicine and had accumulated more than five years of clinical or research experience.

Phase 2: A patient list was compiled that included both inpatients and outpatients diagnosed with ischaemic stroke during the early rehabilitation period. Individuals fulfilling the inclusion criteria were briefed about the study and subsequently invited to join. Those who consented signed an official consent form. Patients then completed the Phase 1 questionnaire, typically within a 20-minute timeframe.

Study instruments and outcome measures

The questionnaire was divided into three major components:

1. General demographic information: full name, hospital patient code, age, gender, height, weight, BMI, and residential address.
2. Modern Medicine-based shoulder pain assessment: pain severity and stroke duration (measured from symptom onset to the time of survey).
3. Traditional Medicine-based shoulder pain characteristics.

Pain intensity was assessed using the Numeric Rating Scale (NRS), a digitized adaptation of the Visual Analog Scale (VAS). The NRS consists of 11 numerical points ranging from 0 ("no pain") to 10 ("worst imaginable pain"). Participants selected the number that most accurately matched their pain level [23]. Based on Boonstra (2016), NRS values were categorized into three groups: Mild (1–5), Moderate (6–7), and Severe (8–10) [24]. The one-dimensional format makes NRS practical for repeated use, easily understood, and especially advantageous for individuals with limited educational backgrounds [25]. Its feasibility and reliability have been validated [26]. Compared to the VAS, the NRS offers simpler administration, fewer errors, and broad patient accessibility [26, 27].

Variables

Independent variables:

- Age: a quantitative variable computed from year of birth to the survey year.
- Age group: nominal variable with three categories—18–29 years (young adults), 30–59 years (middle-aged adults), and ≥60 years (older adults).
- Gender: qualitative variable with two values (male, female).
- BMI: quantitative variable calculated from height and weight.
- Obesity: binary variable indicating presence or absence of obesity (BMI ≥25 kg/m² based on IDI & WPRO criteria).
- Stroke duration: quantitative variable determined by the time span from stroke onset to the survey date and classified into two periods: 24 hours–<30 days (Period 1) and 30–90 days (Period 2).
- Pain level: ordinal variable derived from the self-reported NRS categories (mild, moderate, severe).

Dependent variables

Seventeen Traditional Medicine Jian Tong characteristics were recorded as dichotomous variables (Yes/No):
fixed shoulder pain; moving shoulder pain; intermittent shoulder pain; shoulder pain with heaviness; cold shoulder pain; burning shoulder pain; shoulder pain relieved by warmth; shoulder pain relieved by cold; shoulder pain aggravated by cold; dull shoulder pain; shoulder pain with numbness; pale shoulder skin; red shoulder skin; purple shoulder skin; distended shoulder; shoulder pain with contraction; and shoulder pain aggravated by exertion.

Data analysis

Statistical analyses were conducted using SPSS version 22. Qualitative variables were presented as frequencies and percentages. Quantitative variables were summarized as mean ± standard deviation when normally distributed or as median with interquartile range when non-normal **(Figure 1)**.

A binary multivariate logistic regression model was employed to examine the association between each Jian Tong characteristic and the independent variables (age group, gender, stroke stage, and NRS-based pain level). Statistical significance was set at $p < 0.05$ **(Figure 1)**.

Ethical considerations

This study adhered to the ethical standards of the Declaration of Helsinki. Approval was obtained from the Council of Ethics in Biomedical Research at the University of Medicine and Pharmacy at Ho Chi Minh City on December 29, 2022 (Approval No. 1162/HĐĐĐ-ĐHYD). Data were collected using a structured questionnaire. Participants were fully informed about study procedures before enrollment and were free to withdraw at any time. All personal information was strictly confidential and used exclusively for research purposes.

Results and Discussion

Phase 1

A review of TM literature identified 10 eligible documents, including seven curricula and three monographs **(Table 1)**. After removing duplicates and synthesizing information, five TM syndromes were documented: Wind-Cold-Dampness, Wind-Damp-Heat, Phlegm-Dampness, Blood Stasis, and Qi and Blood Deficiency. Sixteen shoulder pain features (SP01–SP17) were also extracted. “Pain alleviated by warmth” appeared in all documents (100%), whereas “intermittent pain,” “pale skin,” and “purple skin” were the least reported (10%) **(Table 2)**.

Table 1. Selected literary documents

No.	Language	Type	Publication date	Author(s)	Title (Name)
1	Vietnamese	Curriculum	2021	Trinh Thi Dieu Thuong, Nguyen Van Dan	Pathology and neurological treatment combine Eastern and Western Medicine
2	Vietnamese	Curriculum	2016	Nguyen Thi Son	Symptoms of Oriental Medicine
3	Vietnamese	Curriculum	2017	Nguyen Nhuoc Kim	Internal pathology of Traditional medicine
4	Vietnamese	Curriculum	2011	Tran Quoc Bao	Internal pathology of Traditional medicine
5	Vietnamese	Monograph	1997	Hoang Bao Chau	Internal Traditional Medicine
6	Vietnamese	Monograph	2000	Le Van Suu	Oriental Medicine Acupuncture and Internal Medicine
7	Vietnamese	Curriculum	2001	Hoang Trong Quang, Tran Thuy Hong	Internal Traditional Medicine
8	Vietnamese (translated from Chinese)	Foreign curriculum	2019	Nanjing Academy of Chinese Medicine	Zhong Yi Xue Gai Lun (translated by the Institute of Oriental Medicine)
9	Vietnamese (translated from Chinese)	Foreign monograph	2003	Institute of Oriental Medicine (translators: Nguyen Thien Quyen, Dao Trong Cuong)	Differential Diagnosis of the Condition in Traditional Medicine
10	English	Foreign curriculum	2018	Giovanni Maciocia	Diagnosis in Chinese Medicine. A Comprehensive Guide

Table 2. Characteristics of post-stroke shoulder pain in Traditional Medicine (TM): Comparison between frequency reported in classical literature and frequency observed in clinical practice

Code	Characteristic	Frequency in literature n (%)	Definition / Diagnostic Criteria	Frequency in clinical practice n (%)

SP01	Fixed-location shoulder pain	7 (70%)	Yes: Pain remains in one or more specific, unchanging points in the shoulder (reported by patient) No: The above symptom is not present	58 (89.2%)
SP02	Wandering/moving shoulder pain	4 (40%)	Yes: Pain shifts from one location to another within the shoulder region (reported by patient) No: The above symptom is not present	7 (10.8%)
SP03	Intermittent shoulder pain	1 (10%)	Yes: Pain comes and goes in episodes, with clear periods of worsening No: The above symptom is not present	42 (64.6%)
SP04	Pain with sensation of heaviness	9 (90%)	Yes: Patient describes the painful shoulder as feeling heavy or weighed down No: The above symptom is not present	29 (44.6%)
SP05	Cold-type shoulder pain	5 (50%)	Yes: Either (1) patient reports cold sensation in the painful shoulder, or (2) the affected shoulder skin feels colder to touch than the contralateral side No: The above symptom is not present	3 (4.6%)
SP06	Burning shoulder pain	6 (60%)	Yes: Either (1) patient reports burning sensation in the shoulder, or (2) the affected shoulder skin feels warmer to touch than the contralateral side No: The above symptom is not present	5 (7.7%)
SP07	Pain relieved by warmth	10 (100%)	Yes: Pain clearly decreases when heat is applied or the shoulder is kept warm No: The above symptom is not present	41 (63.1%)
SP08	Pain relieved by cold	4 (40%)	Yes: Pain clearly decreases when cold is applied to the shoulder No: The above symptom is not present	3 (3.1%)
SP09	Pain worsened by cold exposure	8 (80%)	Yes: Pain intensifies when the shoulder is exposed to cold (weather, wind, cold objects, etc.) No: The above symptom is not present	16 (24.6%)
SP10	Dull, persistent shoulder pain	3 (30%)	Yes: Pain is mild to moderate, constant, and accompanied by a feeling of fatigue or tiredness No: The above symptom is not present	23 (35.4%)
SP11	Shoulder pain accompanied by numbness	5 (50%)	Yes: Either (1) reduced or absent sensation in the painful area, or (2) sensation of ants crawling on the skin No: The above symptom is not present	21 (32.3%)
SP12	Pale or pallid shoulder skin	1 (10%)	Yes: Shoulder skin appears pale with bluish or grayish tint compared to surrounding areas No: The above symptom is not present	4 (6.2%)
SP13	Reddened shoulder skin	6 (60%)	Yes: Shoulder skin is noticeably redder than the contralateral side or other body areas No: The above symptom is not present	11 (16.9%)
SP14	Purple or purplish shoulder skin	1 (10%)	Yes: Shoulder skin shows dark purple coloration or visible purple ecchymoses No: The above symptom is not present	0 (0%)
SP15	Swollen/distended shoulder	9 (90%)	Yes: Visible or palpable swelling of the shoulder that becomes more painful on pressure No: The above symptom is not present	1 (1.5%)
SP16	Shoulder pain with muscle/tendon tightness or contraction	6 (60%)	Yes: Pain accompanied by stiffness or contraction of muscles and tendons in the shoulder No: The above symptom is not present	21 (32.3%)
SP17	Shoulder pain worsened by movement/exertion	8 (80%)	Yes: Pain intensity increases with active or passive movement or physical effort of the affected arm No: The above symptom is not present	59 (90.8%)

*All values are expressed as absolute frequency (percentage).

Phase 2

In the second phase, 65 patients in the early rehabilitation period after ischaemic stroke were assessed. Participants' ages spanned from 39 to 79 years, averaging 62.51 ± 10.11 years. The older adult group represented the largest proportion (63.1%), and no participants fell into the young adult category. Males slightly outnumbered females, accounting for 55.4% versus 44.6%. The mean BMI was 23.84 ± 2.85 kg/m², with roughly one-third of the cohort classified as obese (BMI ≥25 kg/m²). The average time elapsed since stroke onset was 55.98 ± 30.88 days, and the majority (76.9%) were within the 30–90 day post-stroke window **(Table 3)**.

Among the 17 Jian Tong features, 16 were observed during clinical evaluation; "purple shoulder skin" was not detected in any patient. The most prevalent symptom was "shoulder pain aggravated by exertion," reported by 90.8% of participants. In contrast, "shoulder pain alleviated by cold" (3.1 percent) and "distended shoulder" (1.5 percent) were the least frequently noted. The average pain intensity, as measured by the NRS, was 5.58 ± 2.46, with over half of the participants classified in the mild pain category **(Table 2)**.

Analysis revealed that gender significantly influenced the likelihood of presenting "shoulder pain with contraction" ($p = 0.034$). The odds ratio indicated that being female reduced the chance of this symptom by 78% (OR = 0.22, 95% CI: 0.05–0.89), suggesting that male patients were more predisposed to experiencing this particular Jian Tong feature **(Table 4)**.

Pain severity, categorized via NRS, was also examined. Participants in the moderate pain group had an OR of 6.50 (95 percent CI: 0.99–42.52) compared to the mild group, implying a higher—but statistically non-significant—likelihood of "shoulder pain with contraction" ($p = 0.051$). In contrast, patients in the severe pain group exhibited a pronounced increase in probability, with an OR of 19.60 (95 percent CI: 3.70–103.81, $p < 0.001$), indicating that severe pain substantially elevated the risk of this symptom nearly twentyfold **(Table 4)**.

No significant correlations were detected between age, stroke period, or pain level and the remaining fourteen Jian Tong characteristics ($p > 0.05$) **(Table 4)**.

Table 3. Baseline demographic and clinical characteristics of the patients (N = 65)

Variable	Value (N = 65)
Age (years), mean (SD)	62.51 (10.11)
Body mass index (kg/m²), mean (SD)	23.84 (2.85)
Time since stroke onset (days), mean (SD)	55.98 (30.88)
Obesity, n (%)	23 (33.8)
Age category, n (%)	
Young adult (18–29 years)	0 (0)
Middle-aged (30–59 years)	24 (36.9)
Elderly (≥60 years)	41 (63.1)
Sex, n (%)	
Male	36 (55.4)
Female	29 (44.6)
Post-stroke period, n (%)	
Period 1 (24 h–29 days)	15 (23.1)
Period 2 (30–90 days)	50 (76.9)
NRS score (points), mean (SD)	5.58 (2.46)
Pain intensity, n (%)	
Mild	33 (50.8)
Moderate	9 (13.8)
Severe	23 (35.4)

*Data are expressed as mean (standard deviation) or number (percentage). BMI: body mass index; NRS: Numeric Rating Scale

Table 4. Associations between characteristics of post-stroke shoulder pain and age group, sex, post-stroke period, and pain intensity (binary logistic regression)

Characteristic	Middle-aged vs Young adult* (Ref)	Elderly (≥60 y)	Female vs Male* (Ref)	Period 2 (30–90 d) vs Period 1* (Ref)	Moderate vs Mild* (Ref)	Severe vs Mild* (Ref)
Fixed shoulder pain	0.43 (0.06–3.27)	–	1.11 (0.21–5.94)	0.43 (0.04–4.64)	0.24 (0.03–2.19)	1.26 (0.18–8.64)

p-value	0.417	–	0.901	0.489	0.203	0.815
Shoulder pain on movement	2.31 (0.31–17.41)	–	0.90 (0.17–4.80)	2.31 (0.22–24.71)	4.26 (0.46–39.72)	0.79 (0.11–5.45)
p-value	0.417	–	0.901	0.489	0.203	0.815
Intermittent shoulder pain	0.91 (0.30–2.78)	–	0.45 (0.16–1.30)	0.83 (0.23–3.01)	1.19 (0.24–5.98)	1.33 (0.41–4.34)
p-value	0.866	–	0.140	0.776	0.837	0.642
Shoulder pain with heaviness sensation	0.60 (0.19–1.95)	–	2.77 (0.95–8.07)	1.71 (0.45–6.57)	0.35 (0.06–2.08)	1.95 (0.60–6.34)
p-value	0.397	–	0.062	0.435	0.247	0.266
Cold sensation in painful shoulder	2.37 (0.08–72.08)	–	0.64 (0.05–8.29)	1×10^8 (0)	7.50 (0.18–308.34)	1.14 (0.09–19.78)
p-value	0.621	–	0.734	0.998	0.288	0.931
Burning shoulder pain	1.16 (0.10–13.53)	–	0.64 (0.08–4.94)	78×10^6 (0)	0 (0)	5.50 (0.55–55.32)
p-value	0.903	–	0.670	0.999	0.999	0.148
Pain relieved by warmth	1.47 (0.48–4.47)	–	1.22 (0.43–3.50)	0.51 (0.13–1.97)	0.68 (0.14–3.30)	0.82 (0.26–2.65)
p-value	0.498	–	0.708	0.331	0.631	0.742
Pain relieved by cold	0.20 (0.01–5.70)	–	0.52 (0.02–14.18)	18×10^6 (0)	0.44 (0)	128×10^6 (0)
p-value	0.350	–	0.695	0.998	1.000	0.998
Pain worsened by cold	1.18 (0.32–4.37)	–	1.14 (0.35–3.79)	1.88 (0.34–10.30)	1.73 (0.26–11.66)	3.11 (0.83–11.58)
p-value	0.805	–	0.826	0.467	0.575	0.091
Dull shoulder pain	0.88 (0.28–2.78)	–	1.26 (0.43–3.65)	2.73 (0.64–11.64)	0.47 (0.08–2.88)	0.90 (0.28–2.86)
p-value	0.828	–	0.669	0.175	0.417	0.853
Shoulder pain with numbness	0.28 (0.08–1.02)	–	0.38 (0.11–1.30)	1.81 (0.39–8.47)	0.13 (0.01–1.48)	1.64 (0.47–5.70)
p-value	0.053	–	0.124	0.450	0.101	0.436
Pale skin over painful shoulder	0.58 (0.56–6.02)	–	4.11 (0.33–50.77)	10^8 (0)	18×10^7 (0)	14×10^7 (0)
p-value	0.644	–	0.270	0.998	0.998	0.998
Red skin over painful shoulder	1.08 (0.22–5.28)	–	0.17 (0.03–1.02)	0.20 (0.04–1.04)	1.73 (0.22–13.35)	1.53 (0.26–8.87)
p-value	0.923	–	0.053	0.056	0.602	0.634
Distended/swollen shoulder	0.26 (0)	0 (0)	–	22×10^6 (0)	763×10^5 (0)	1.21 (0)
p-value	1.000	0.998	0.998	0.998	0.998	1.000
Shoulder pain with muscle contraction	0.55 (0.15–2.10)	–	0.22 (0.05–0.89)	0.68 (0.14–3.25)	6.50 (0.99–42.52)	19.60 (3.70–103.81)
p-value	0.382	–	0.034	0.628	0.051	<0.001
Shoulder pain aggravated by exertion	0.08 (0.00–1.66)	–	5.63 (0.38–83.55)	8.50 (0.68–106.97)	19×10^7 (0)	22×10^7 (0)
p-value	0.103	–	0.210	0.098	0.999	0.998

Data are presented as odds ratio (95% confidence interval). *Reference group in each comparison.

Shoulder pain in the literature

In this investigation, ten medical publications satisfied the predetermined inclusion criteria, comparable to the approaches of Nguyen THD (2016) and Le THT (2022). By incorporating international sources, the present study broadened the spectrum of shoulder-pain characteristics across diverse populations. The included documents represented multiple regions—Vietnam, China, and several European countries—and reflected various dimensions of Traditional Medicine, ranging from theoretical foundations to pathological interpretations and therapeutic principles [17, 18].

General information about the sample

The mean age of participants was 62.51 ± 10.11 years, aligning with findings reported by Le NB (2021) in Vietnam and Hu X (2022) in China [28, 29]. In the current sample, older adults (≥60 years) constituted the predominant age group (63.1%). This distribution differs from earlier studies such as that of Vo TP (2018), where patients aged 45–65 made up 52.8%, or Nguyen DP (2022), in which individuals aged 50–69 accounted for 48.1% [30, 31]. These discrepancies largely arise from differences in age-group classification schemes across studies; however, the overall pattern remains consistent with well-established epidemiological evidence showing that the risk of stroke approximately doubles with every decade after age 55 [32].

A higher representation of male patients was seen in this study, a pattern also reported in both national and international literature [30, 33, 34]. This observation is compatible with the recognition of male gender as a contributing risk factor for stroke [32].

The recorded mean BMI of 23.84 ± 2.85 kg/m² revealed that roughly one-third of participants were obese. This proportion is comparable to a Korean cohort studied by Jeong HY (2020) [35], yet lower than the values observed in the Danish investigation by Dehlendorff C (2014), which reported a mean BMI of 25.7 with over half of the sample classified as obese [36]. Such contrasts likely reflect established differences in body weight trends, with Asian populations exhibiting lower prevalence rates of overweight and obesity compared with those in Europe and North America, producing correspondingly lower BMI averages and obesity proportions in Asian studies [37].

The mean stroke duration in the present study was 55.98 ± 31.88 days, which is notably longer than in several previous reports. A probable explanation is that many patients opt for home-based management once basic mobility and functional capacity improve, due to financial considerations and the extended period required for full recovery [38, 39].

Shoulder pain after stroke

The pattern of findings derived from clinical observation closely paralleled those identified in the reviewed literature. Symptoms that were most frequently reported in medical texts—such as "shoulder pain aggravated by exertion," persistent or "fixed shoulder pain," "pain alleviated by warmth," and sensations of "heaviness"—were likewise prominent among patients in practice. These observations are consistent with the work of Dromerick AW (2008), who noted that shoulder pain intensifies with passive movement in a large proportion of post-stroke patients (88.2%), restricting functional capacity and day-to-day activity [40]. From a Traditional Medicine perspective, individuals recovering from stroke commonly present with Qi deficiency, which exacerbates exertion-related discomfort. A more pronounced deficiency of Qi is also believed to aggravate Blood stasis, giving rise to deeper and more persistent patterns of fixed pain [12, 41].

In the theoretical framework of post-stroke shoulder pain, the invasion of external pathogenic factors—Wind, Cold, and Dampness—is frequently cited. Among these, Cold and Dampness are regarded as particularly influential in shaping the characteristic symptoms. Cold's constricting effect disrupts the smooth circulation of Qi and Blood, producing severe pain, while Dampness imparts heaviness and a sense of obstruction in the joints [12]. Treatment therefore aims to expel these external influences from the channels while reinforcing internal organ function to improve local circulation and alleviate pain. Approaches that warm and dispel Cold—such as promoting the body's Fire through Kidney-Yang—or that resolve Dampness through Spleen-Qi tonification are central strategies. Because Cold-induced pain often responds to heat, the clinical prominence of "pain alleviated by warmth" is readily explained [42].

The therapeutic effectiveness of warming techniques has been demonstrated in several studies. Gao S (2017) and Zhong GL (2019) both reported significant reductions in post-stroke shoulder pain using warm acupuncture with external herbal applications or penetrating acupuncture methods [43, 44]. Such outcomes may reflect the predominance of Cold-type shoulder pain among the patient groups studied. More broadly, deficiencies of Qi, Blood, Liver-Blood, Kidney-Essence, and Kidney-Yang weaken the body's ability to resist external pathogens and maintain unobstructed flow within the channels. When the Liver and Kidney are compromised, insufficient Essence and Blood production limits the capacity of Kidney-Yang to transform fluids and generate robust Defensive Qi, lowering resistance to environmental factors and contributing to persistent pain.

Conversely, features that appear infrequently in the literature were also uncommon or absent in clinical practice. "Distended shoulder," for example, is typically associated with heat signs—redness, swelling, marked pain—commonly linked to wind-heat presentations or acute inflammatory reactions that tend to worsen patient status [12, 45]. Although "purple shoulder skin" is mentioned in the literature, it did not appear in clinical observations. This manifestation usually reflects Blood stasis resulting from trauma [12, 46], a mechanism that does not align with the typical etiology of post-stroke shoulder pain, which seldom involves direct injury to the shoulder region. The mean pain score in this study was recorded as 5.58 ± 2.455, with mild pain constituting the largest subgroup (50.8%). These values echo the findings of Gaitan M. (2019), who observed that post-stroke shoulder pain seldom exceeded 6/10 on the VAS scale [47]. Likewise, Duong TTH (2022), using the NRS scale to evaluate patients with acute ischaemic stroke, documented that shoulder pain was predominantly mild [48].

Associations between shoulder pain characteristics and age, sex, stroke period, and pain levels

Identifying which factors shape the manifestation of Jian Tong characteristics requires examining multiple influences at once. For this reason, instead of analysing each factor separately, a binary multivariate logistic regression approach was selected. This model is particularly suitable when the dependent variable is dichotomous (e.g., "yes" or "no") and several predictors are being evaluated simultaneously. By adjusting for all other variables within the model, it becomes possible to determine the unique contribution of each factor and clarify how confounding influences may alter that relationship. In this analysis, each Jian Tong feature served as an individual dependent variable, while age category, sex, stroke period, and NRS pain levels functioned as the independent variables [49].

When pain severity was taken into account, both moderate and severe pain levels markedly elevated the likelihood of presenting "shoulder pain with contraction," with odds ratios of 6.50 and 19.60, respectively. The clustering of this symptom within the severe-pain group aligns with Traditional Medicine theory. According to TM principles, contraction-type pain is typically linked either to the intrusion of wind–cold–dampness or to deficits of Liver-Blood or Liver-Yin. Cold, in particular, has a constrictive influence that restricts the movement of Qi and Blood, encouraging stagnation and leading to pronounced, piercing pain. Its contracting nature also tightens the muscles, sinews, and vessels, contributing to stiffness and limiting fluid movement. Meanwhile, insufficient Liver-Blood fails to nourish the sinews, setting the stage for spasms, impaired extension and flexion, and muscle cramping [12, 50]. Several modern interpretations explain that this TM concept corresponds closely to post-stroke spasticity, a phenomenon well-documented in contemporary neurological studies [51, 52].

Sex differences also emerged as an influential factor, and from the perspective of TM, this is unsurprising given the differing constitutional tendencies of men and women. Distinct bodily structures and organ patterns shape different physiological and psychological profiles. Men are described as relying more heavily on Qi, making them more susceptible to Qi depletion, whereas women depend more on Blood and therefore tend to be more vulnerable to Blood-related disorders. The TM explanation for "shoulder pain with contraction" emphasizes pathogenic Wind–Cold–Dampness—particularly Cold—as well as Liver-Blood/Liver-Yin deficiency. In men, chronic overwork, inadequate nourishment, or insufficient rest may weaken Qi to the point that it can no longer warm or activate the vessels. In this weakened state, Cold can penetrate more easily or Yin can become excessive, consuming Yang and impairing circulation so that Blood cannot flow freely.

The intrinsic behaviour of Cold further amplifies the tendency toward contraction. Qi and Blood, although conceptually opposite—Qi being Yang-like and active, Blood being Yin-like and substantial—are interdependent. Qi enables the generation, movement, and maintenance of Blood, while Blood serves as the material foundation upon which Qi depends. Clinical observations show that severe Blood loss can drain Qi, while prolonged Qi depletion (such as from persistent sweating or fatigue) can eventually lead to Blood deficiency. Thus, a pattern of Qi/Yang weakness may gradually evolve into Blood/Yin insufficiency if left unaddressed [12]. Supporting this perspective, Guo JS (2012) reported that Qi deficiency was one of the most common constitutional types among male pilots, with 17.4% fitting this pattern [53]. Such findings reinforce the notion that male constitutions may be more prone to developing symptoms consistent with "pain with contraction."

Strength and limitation

In Vietnam, the pathological features of shoulder pain after stroke from the perspective of Traditional Medicine (TM) have not been comprehensively explored. Consequently, this investigation represents the first attempt to document how frequently TM-based shoulder pain characteristics appear in everyday clinical settings. Pain intensity was quantified using the NRS score from modern medicine, and the study further analyzed how Jian

Tong characteristics—defined within Traditional Medicine—were distributed and how they related to demographic or clinical variables. Through this approach, the study offered preliminary evidence linking concepts from Modern Medicine with those from TM, providing an initial platform for subsequent research to pursue new directions aimed at improving management for post-stroke shoulder pain.

The study benefited from using the NRS scale, a tool recognized for its practicality, reliability, and capacity to limit measurement errors. Its simplicity and wide acceptance in evaluating pain intensity make it well suited for clinical assessment of post-stroke shoulder pain [26, 27]. The literature sources were retrieved from three prominent national libraries, and the questionnaire underwent expert evaluation to ensure methodological soundness prior to implementation. A multivariable logistic regression model was used to determine how age group, gender, stroke period, and NRS pain score influenced Jian Tong characteristics. Additionally, the sample was restricted to patients with ischaemic stroke in the early rehabilitation phase to maintain homogeneity. Future investigations are planned to include patients with hemorrhagic stroke, lacunar stroke, and those in different rehabilitation phases.

Despite the strengths, several limitations remain. Data collection was limited to Ho Chi Minh City, the sample size was modest, and the study duration was relatively short; therefore, the findings may not fully represent the broader population. Expanding recruitment sites and prolonging data collection would enhance the diversity and representativeness of future samples. The focus on ischaemic stroke patients in early rehabilitation means that characteristic patterns of post-stroke shoulder pain in cerebral hemorrhage and other rehabilitation periods—acute, late, or chronic—could not be captured. Moreover, the use of a descriptive cross-sectional design, while advantageous for rapid assessment, does not allow determination of temporal relationships or directionality between exposures and outcomes. Longitudinal designs may therefore be more appropriate for understanding how post-stroke shoulder pain characteristics evolve over time.

Conclusion

The study achieved its primary aim by identifying the frequencies and associations of TM-defined shoulder pain characteristics—derived from both classical texts and clinical observations—and their relationship with general demographic variables. The analysis revealed that the NRS pain level was linked to "shoulder pain with contraction," while sex was related to "shoulder pain with heaviness." These findings can support the development of teaching and training materials for educational institutions and clinical centers, and they provide an initial foundation for larger research endeavors. Upcoming directions could include prospective investigations examining how post-stroke shoulder pain presentations relate to the therapeutic outcomes of TM interventions, studies involving patients with hemorrhagic or lacunar stroke, or studies focusing on later stages of rehabilitation beyond the early phase. Furthermore, future research could explore lesion localization using imaging to better clarify how the site of cerebrovascular injury contributes to shoulder pain after stroke.

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