A 10-Year Clinical Review of Raw Pinellia Ternata in Tumor Treatment: Medication Patterns and Safety Assessment Postprint

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Abstract

Abstract

Background: Raw *Pinellia ternata* (Sheng Ban Xia) has a definite therapeutic effect on malignant tumors. However, due to the toxic characteristics of the raw product, its safe dosage range and rational medication standards remain controversial, and clinical application faces the challenge of balancing toxicity and efficacy.

Objective: To analyze the clinical medication characteristics and safety of the toxic herbal piece Raw *Pinellia ternata* in the oncology outpatient department of Dongfang Hospital, Beijing University of Chinese Medicine, and to provide a reference for the standardized application of Raw *Pinellia ternata* in medical institutions.

Methods: General data, visit information, prescription data, and liver and kidney function test results of cancer patients who visited the oncology outpatient department of Dongfang Hospital, Beijing University of Chinese Medicine from January 2012 to August 2023 and took prescriptions containing Raw *Pinellia ternata* were retrospectively included. Data integration, statistical calculations, and image processing were performed using Microsoft Excel, IBM SPSS Statistics 30.0, R4.3.2, and Origin Pro 2025b software.

Results: A total of 44,066 prescriptions were included, involving 11,971 cancer patients (51.91% male, 48.09% female), predominantly elderly (69.87%, 8,364/11,971). The core syndrome types of the prescriptions included the syndrome of intermingled phlegm and stasis, the syndrome of deficiency of both Qi and Yin, and the syndrome of Qi stagnation and blood stasis. For 35,349 (80.22%) prescriptions, the single dose was 10–15 g, which is higher than the recommended dose in the Chinese Pharmacopoeia (3–9 g); 63.09% (7,553 cases)

of patients had a treatment course of $\leq$ 30 d. The volume of Raw *Pinellia ternata* prescriptions has shown a downward trend over the past decade ($r = -0.964, P < 0.001$). The top three tumor diseases in terms of the number of people using Raw *Pinellia ternata* were lung malignancy, colorectal malignancy, and breast malignancy. Using lung cancer as a reference, esophageal cancer, liver cancer, uterine cancer, ovarian cancer, and pancreatic cancer were influencing factors for the dosage of Raw *Pinellia ternata* (esophageal cancer: $B = -145.195, 95\%CI = -280.686$ to -9.705; liver cancer: $B = -253.363, 95\%CI = -400.976$ to -105.751; uterine cancer: $B = -866.593, 95\%CI = -1023.046$ to -710.140; ovarian cancer: $B = -847.736, 95\%CI = -1008.190$ to -687.281; pancreatic cancer: $B = -236.043, 95\%CI = -423.324$ to -48.762; $P < 0.05$), while age and gender factors were not influencing factors for the dosage of Raw *Pinellia ternata* ($P > 0.05$).

Safety analysis showed that all prescriptions strictly followed the operational specification of decocting first for 30 min; 86 prescriptions (0.20%) had compatibility contraindications with aconite-type drugs; 3,476 prescriptions (7.89%) were combined with ginger types (fresh ginger/dried ginger) to reduce toxicity; and 15,214 prescriptions (34.53%) were compatible with licorice for detoxification. In the Chinese medicine treatment group ($n = 71$), there were no statistically significant differences in liver and kidney function indicators before and after treatment ($P > 0.05$). In the combined Chinese medicine and chemotherapy/targeted therapy group ($n = 7$), there was a statistically significant difference in albumin (ALB) before and after treatment ($P < 0.05$). Within the Chinese medicine treatment group, there was no statistically significant difference between the $\leq$ 9 g ($n = 21$) and 10–15 g ($n = 48$) subgroups before and after treatment ($P > 0.05$). Excluding 754 patients who received combined chemotherapy during treatment, 289 out of 11,217 patients (2.58%) experienced Grade 1 gastrointestinal adverse reactions, with an incidence of 3.22% (60/1,861) in the $\leq$ 9 g group and 2.47% (229/9,255) in the 10–15 g group; the difference in the incidence of gastrointestinal adverse reactions between the two groups was not statistically significant ($\chi^2 = 3.439, P > 0.05$). A total of 78 patients (0.70%) experienced transient palpitations after taking the medication, with an incidence of 0.75% (14/1,861) in the $\leq$ 9 g group and 0.67% (62/9,255) in the 10–15 g group; the difference between the two groups was not statistically significant ($\chi^2 = 0.155, P > 0.05$).

Conclusion: In the oncology department of this center, Raw *Pinellia ternata* is commonly used for cancer patients with syndrome types involving phlegm pathogens, with a common dosage of 10–15 g, and the dosage is adjusted according to the severity of phlegm pathogens in different cancer types. Clinical administration is standardized, and medication safety can be ensured through strict decoction (decocting first for 30 min) and rational compatibility (toxicity-reducing drugs such as ginger and licorice). No significant correlation was found between the excessive use or combined medication of Raw *Pinellia ternata* and clear organ function damage in this study. Existing data support that under the premise of standardized operation, the dosage range of 10–15 g of Raw *Pinellia*

ternata has reliable safety for cancer patients, providing an empirical reference for rational clinical application.

Full Text

Preamble

Chinese General Practice ·Medication Guidance ·A 10-Year Clinical Review of Raw Pinellia Ternata in Oncology: Medication Patterns and Safety Assessment

Abstract

Objective: To systematically analyze the clinical application patterns and safety of Raw Pinellia Ternata (RPT) in the treatment of malignant tumors over the past decade, providing a reference for standardized clinical medication.

Methods: A retrospective analysis was conducted on clinical studies and case reports involving the use of RPT for tumor treatment published between 2013 and 2023. Data regarding dosage, processing methods, combination therapies, treatment duration, and adverse reactions were extracted and synthesized.

Results: The review indicates that RPT is frequently utilized in traditional Chinese medicine (TCM) oncology for its perceived effects in resolving phlegm, dissipating masses, and detoxifying. Dosage varies significantly across different cancer types, often exceeding the pharmacopoeia' s recommended limits under strict medical supervision. Safety assessments show that when processed correctly (e.g., long-term decoction) and combined with specific herbs (e.g., Shengjiang/Zingiberis Rhizoma Recens), the incidence of toxic side effects is significantly reduced.

Conclusion: RPT demonstrates potential therapeutic value in oncology; however, its clinical use requires rigorous adherence to dosage limits and processing protocols to ensure patient safety.

Introduction

Malignant tumors remain a significant challenge to global health. In the field of Traditional Chinese Medicine (TCM), the etiology of tumors is often attributed to "phlegm-dampness," "blood stasis," and "toxic heat." As a potent herb for "transforming phlegm and dissipating nodules," Raw Pinellia Ternata (RPT, *Sheng Banxia*) has been widely employed in clinical practice, particularly for gastrointestinal, lung, and thyroid malignancies.

Despite its efficacy, RPT is classified as a toxic herb. The *Pharmacopoeia of the People' s Republic of China* mandates strict processing (resulting in *Fa Banxia*, *Jiang Banxia*, etc.) to reduce toxicity. However, many veteran TCM

practitioners argue that the "raw" form possesses superior anti-tumor properties that are diminished by extensive processing. This 10-year clinical review aims to evaluate how RPT is currently used in oncology and to assess the associated safety risks.

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1. Medication Patterns of Raw Pinellia Ternata

1.1 Dosage

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背景

Raw Pinellia ternata (Sheng Ban Xia) exhibits definitive therapeutic efficacy against malignant tumors. However, due to the inherent toxicity of the raw medicinal herb, its safe dosage range and standards for rational clinical use remain controversial. Consequently, its clinical application faces significant challenges in balancing toxicity and therapeutic efficacy.

This study aims to analyze the clinical medication characteristics and safety profiles of the toxic herbal piece, Raw Pinellia ternata, as prescribed in the oncology outpatient department of Dongfang Hospital, Beijing University of Chinese Medicine. The findings are intended to provide a reference for the standardized application of Raw Pinellia ternata within medical institutions.

方法

This retrospective study included general information, clinical visit data, prescription details, and liver and kidney function test results of cancer patients who visited the oncology outpatient department of Dongfang Hospital, Beijing University of Chinese Medicine, between January 2012 and August 2023 and were prescribed formulas containing *Rhizoma Pinelliae* (Sheng Ban Xia). Data integration, statistical calculations, and visualization were performed using Microsoft Excel, IBM SPSS Statistics 30.0, R 4.3.2, and Origin Pro 2025b software.

结果

A total of 44,066 prescriptions were included in this study, involving 11,971 oncology patients (51.91% male, 48.09% female). The patient population was predominantly elderly, accounting for 69.87% (8,364/11,971) of the cohort. The core Traditional Chinese Medicine (TCM) syndromes identified in the prescriptions included the intermingling of phlegm and stasis, deficiency of both Qi

and Yin, and Qi stagnation with blood stasis. Regarding dosage, 35,349 prescriptions (80.22%) utilized a single-dose range of 10–15 g, which exceeds the recommended dosage of 3–9 g specified in the *Pharmacopoeia of the People' s Republic of China*. Furthermore, 63.09% of patients (7,553 cases) underwent a treatment course of $\leq$ 30 days. Over the past decade, the volume of prescriptions containing *Rhizoma Pinelliae* (Raw Banxia) has shown a downward trend ($\beta = -0.964, P < 0.001$).

The top three oncological conditions for which *Rhizoma Pinelliae* was prescribed were lung malignancy, colorectal malignancy, and breast malignancy. Using lung cancer as a reference group, multivariate analysis indicated that esophageal cancer, liver cancer, uterine cancer, ovarian cancer, and pancreatic cancer were significant factors influencing the dosage of *Rhizoma Pinelliae* (Esophageal cancer: $\beta = -145.195, 95\%CI = -280.686$ to -9.705; Liver cancer: $\beta = -253.363, 95\%CI = -400.976$ to -105.751; Uterine cancer: $\beta = -866.593, 95\%CI = -1023.046$ to -710.140; Ovarian cancer: $\beta = -847.736, 95\%CI = -1008.190$ to -687.281; Pancreatic cancer: $\beta = -236.043, 95\%CI = -423.324$ to -48.762; all $P < 0.05$). Conversely, age and gender were not found to be significant factors affecting dosage ($P > 0.05$).

Safety analysis revealed that all prescriptions strictly adhered to the operational protocol of decocting the herb first for 30 minutes. In terms of compatibility, 86 prescriptions (0.20%) contained contraindications involving Aconite-related herbs. To mitigate toxicity, 3,476 prescriptions (7.89%) were combined with ginger (fresh or dried), and 15,214 prescriptions (34.53%) were combined with *Glycyrrhizae Radix* (Licorice). In the TCM-only treatment group ($n = 71$), there were no statistically significant differences in liver and kidney function indicators before and after treatment ($P > 0.05$). In the group receiving combined TCM and chemotherapy/targeted therapy ($n = 7$), a statistically significant difference was observed in albumin (ALB) levels before and after treatment ($P < 0.05$). Within the TCM-only group, no significant differences were found between the $\leq$ 9 g subgroup ($n = 21$) and the 10–15 g subgroup ($n = 48$) regarding pre- and post-treatment changes ($P > 0.05$). After excluding 754 patients who received concurrent chemotherapy during the treatment period, 289 out of the remaining 11,217 patients (2.58%) experienced Grade 1 gastrointestinal adverse reactions. Among these, the incidence rate in the $\leq$ 9 g group was 3.22%···

2 =3.439，

The incidence of gastrointestinal adverse reactions was 3.22% (60/1,861) in the $\leq$ 9 g group and 2.47% (229/9,255) in the 10–15 g group. The difference in the incidence of gastrointestinal adverse reactions between the two groups was not statistically significant ($\chi^2 = 3.65, P > 0.05$). A total of 78 patients (0.70%) experienced transient palpitations after medication; the incidence was 0.75% (14/1,861) in the $\leq$ 9 g group and 0.69% (64/9,255) in the 10–15 g group.

2 =0.155， P> 0.05)。

结论

The Oncology Department of our center commonly utilizes Raw *Pinelliae Rhizoma* (Sheng Banxia) for cancer patients presenting with phlegm-pathogen-related syndromes.

The incidence of adverse events was 0.67% (62/9,255), and there was no statistically significant difference between the two groups (χ^2 test). For cancer patients with comorbid phlegm-type syndromes, the common dosage ranges from 10 to 15 g, with adjustments made based on the severity of the phlegm pathogen across different cancer types. Clinical administration is strictly standardized; safety is ensured through rigorous decoction methods (pre-boiling for 30 minutes) and rational compatibility with detoxification agents such as ginger species and *Glycyrrhizae Radix et Rhizoma* (Licorice). This study found no significant correlation between the off-label high-dose use or combined medication of Raw *Pinelliae Rhizoma* and definitive organ functional damage. Existing data support that, under standardized operational protocols, a dosage range of 10–15 g of Raw *Pinelliae Rhizoma* demonstrates reliable safety for tumor patients, providing an empirical reference for rational clinical application.

Keywords: Raw *Pinelliae Rhizoma*; Tumor; Chinese medicine toxicity; Clinical medication characteristics; Safety of Chinese materia medica **CLC Number:** [Insert Number] **Document Code:** A **10-Year Clinical Review of Raw *Pinelliae Rhizoma* in Tumor Treatment: Usage Patterns and Safety Evaluation Cite this article:**

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Background

Raw Pinelliae Rhizoma (a toxic TCM decoction piece) has demonstrated confirmed therapeutic efficacy in malignant tumor treatment. However, due to its inherent toxicity characteristics, substantial controversies persist regarding its safe dosage range and standardized administration protocols, posing significant clinical challenges in balancing toxicity and efficacy.

Objective This study aimed to investigate the clinical medication characteristics and safety of raw Pinelliae Rhizoma in the outpatient service of the Department

of Oncology, Dongfang Hospital, Beijing University of Chinese Medicine, from 2012 to 2023, thereby providing evidence-based references for the standardized application of raw Pinelliae Rhizoma in medical institutions.

Methods

A retrospective collection of data from tumor patients who were prescribed formulations containing raw Pinelliae Rhizoma between 2012 and 2023 was conducted. The dataset included demographic characteristics, clinical visit records, prescription details, and liver and kidney function test results. Data integration, statistical analysis, and graphical processing were performed using Microsoft Excel, IBM SPSS Statistics 30.0, R 4.3.2, and Origin Pro 2025b.

Results

A total of 44,066 prescriptions were included, involving 11,971 tumor patients (51.91% male, 48.09% female), predominantly elderly (69.87%, 8,364/11,971). The core syndrome types included Intermingled Phlegm and Blood Stasis Syndrome, Qi-Yin Deficiency Syndrome, and Qi Stagnation-Blood Stasis Syndrome. Out of the prescriptions, 35,349 (80.22%) used a single-dosage range of 10-15 g, exceeding the recommended dosage in the Chinese Pharmacopoeia (3-9 g); meanwhile, 63.09% of patients (7,553 cases) had a past decade(-0.964, 0.001).Lung cancer, colorectal cancer, and breast cancer were the primary tumor types for which raw Pinelliae Rhizoma was prescribed. Taking lung cancer as the reference, esophageal cancer, liver cancer, uterine cancer, ovarian cancer, and pancreatic cancer were identified as influencing factors for the dosage of raw Pinelliae Rhizoma (esophageal cancer: -145.195, 95% =-280.686 to -9.705; liver cancer: -253.363, 95% =-400.976 to -105.751; uterine cancer: -866.593, =-1023.046 to -710.140; ovarian cancer: -847.736, 95% =-1008.190 to -687.281; pancreatic cancer: -236.043, =-423.324 to -48.762, 0.05). Age and gender were not found to be significant factors affecting the dosage of raw Pinellia 0.05).Safety analysis showed that all prescriptions strictly followed the operational standard of 30-minute pre-decoction; 86 prescriptions(0.20%) had incompatibility with Aconitum species, 3,476 prescriptions(7.89%) were combined with ginger- family herbs (fresh ginger/dried ginger) for toxicity reduction, and 15,214 prescriptions(34.53%) were compatible with licorice treatment in the Chinese medicine monotherapy group (71) (0.05). In the combined Chinese medicine with chemotherapy/ targeted therapy group (7), a statistically significant difference was observed in albumin(ALB) (0.05). In the Chinese medicine monotherapy group, there was no statistically significant difference between the dose subgroups of $ $9 g (21) and 10-15 g (before and after treatment (0.05).After excluding 754 patients who received combined chemotherapy during the treatment period, among 11,217 patients, 289 (2.58%) experienced grade 1 gastrointestinal adverse events. The incidence was 3.22% (60/1,861) in the $ $9 g group and 2.47% (229/9 255) in the 10-15 g group, with no statistically significant difference between the two groups =3.439, 0.05). A total of 78 patients

(0.70%) reported transient palpitations after medication, with an incidence of 0.75% (14/1 861) in the $ 9*ggroupand*0.67 $ used for syndromes complicated by phlegm pathogens, with a typical dosage range of 10-15 g. The administered amount is adjusted based on the severity of phlegm pathogens across different cancer types. Standardized clinical administration, including strict decoction procedures (pre-decocted for 30 minutes) and rational combination with detoxifying agents (such as ginger and licorice), ensures medication safety. In this study, no significant correlation was observed between excessive use of raw Pinelliae Rhizoma or Pinelliae Rhizoma within the dosage range of 10-15 g has reliable safety in tumor patients, providing empirical references for its rational clinical application.

Key words Raw Pinelliae Rhizoma; Neoplasms; Toxicity of Chinese medicine; Clinical medication characteristics; Chinese medicine safety

In the field of Chinese General Medicine, tumors are categorized under the domain of "accumulation syndrome" (*ji zheng*). The classical text *Danxi Xinfa* (Essential Teachings of Danxi) records: "Whenever a person has a mass in the upper, middle, or lower parts of the body, it is mostly due to phlegm." This elucidates that the internal obstruction of phlegm-turbidity is a key factor in the formation of masses (*zhengjia jiju*) and tumor metastasis [**?**]. The Oncology Department of Dongfang Hospital of Beijing University of Chinese Medicine (hereinafter referred to as "our hospital") approaches the treatment of malignant tumors based on the theory of phlegm. It is posited that the formation of tumors results from visceral dysfunction leading to the failure of fluid transformation, which then accumulates to produce phlegm. Internal obstruction by phlegm-turbidity subsequently impairs the circulation of qi and blood; over time, this leads to qi stagnation and blood stasis, which breeds "cancer toxins," eventually resulting in the formation of masses and the further depletion of qi and yin.

In response to the pathogenic characteristics of tumors—namely, "internal obstruction by malignant phlegm, fixed localization, and protracted recovery" — the Oncology Department of our hospital has developed a specialized tumor treatment protocol centered on *Pinellia ternata* (Banxia). This approach is characterized by "appropriate supra-pharmacopoeial dosing and the skillful use of raw preparations."

Raw *Pinellia ternata* (Sheng Banxia) is warm in nature, acrid in taste, and toxic. It enters the spleen, stomach, and lung meridians, possessing the therapeutic effects of drying dampness, transforming phlegm, descending rebellious qi to stop vomiting, and dissipating nodules to resolve masses. Modern pharmacological studies have confirmed its anti-tumor effects [**?**]. Our department' s preference for raw preparations aims to harness the potent medicinal strength and the superior dissipating properties of the raw herb. The use of appropriate supra-pharmacopoeial doses is intended to ensure that the "medicine matches the disease," thereby enhancing its phlegm-transforming and anti-cancer efficacy. As Zhang Xichun stated in *Records of Traditional Chinese and Western Medicine in Combination*: "I have often considered that medicine is used to eliminate

disease; the medicine administered should be borne by the disease, not by the person." Throughout history, the clinical application and dosage of raw *Pinellia ternata* have been controversial due to its toxicity. Since the *Shennong Ben Cao Jing* (Shennong' s Classic of Materia Medica), it has been classified as a "lower-grade" herb due to its toxicity, and it remains categorized as toxic in the *Pharmacopoeia of the People' s Republic of China*. The Pharmacopoeia recommends using processed versions for internal administration at a dosage of 3–9 g. However, research by Sun et al. has confirmed that while processed *Pinellia* exhibits reduced toxicity compared to the raw form, its tumor-suppressive capacity is also correspondingly diminished. Currently, the supra-pharmacopoeial application of *Pinellia* is common across many clinical hospitals in China. Long-term clinical observations in our department have found that, provided indications are strictly followed and dosages are carefully controlled, the appropriate supra-pharmacopoeial use of raw *Pinellia* (exceeding the recommended doses in the Pharmacopoeia) does not lead to significant adverse reactions or organ damage, yet yields significant therapeutic effects. To systematically evaluate the clinical characteristics and safety of raw *Pinellia* usage, this study conducts a retrospective analysis based on outpatient medication data from our hospital' s Oncology Department, aiming to provide evidence-based support for the standardized application and safety management of raw *Pinellia*.

1.1 研究对象

Using a retrospective research methodology, this study included oncology patients treated at the Dongfang Hospital of Beijing University of Chinese Medicine between January 2012 and August 2023 who were prescribed formulas containing raw *Pinellia ternata* (Sheng Banxia).

The inclusion criteria were as follows: (1) Western medical diagnosis must comply with the "Holistic Integrative Management of Complementary and Alternative Medicine in Oncology (CACA) Guidelines."

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The diagnostic criteria for tumors; (2) records of Traditional Chinese Medicine (TCM) syndromes related to tumors; (3) prescriptions issued between January 2012 and August 2023; (4) prescription types consisting of TCM decoctions; (5) prescriptions containing *Rhizoma Pinelliae* (Raw Pinellia); and (6) patients who adhered to medical advice regarding medication during treatment. Exclusion criteria were: (1) primary tumors involving multiple sites; (2) prescriptions where the route of TCM administration was external; and (3) incomplete medical records or insufficient prescription information.

This study involved a secondary analysis of anonymized retrospective data. It was reviewed and approved by the Ethics Committee of Dongfang Hospital, Beijing University of Chinese Medicine, with a waiver granted for formal ethical review and informed consent.

Data Collection and Organization: General information, clinical visit details, prescription data, and liver and kidney function test results were retrieved from the outpatient electronic medical record system of the Oncology Department at our hospital for all patients who received prescriptions containing *Rhizoma Pinelliae* between January 2012 and August 2023.

The collected data included: (1) General information: de-identified coding, gender, and age; (2) Clinical visit information: visit dates, and diagnoses in both Western medicine and TCM; (3) Prescription data: formula composition, dosage of individual herbs, number of doses, and duration of treatment; (4) Liver and kidney function results: alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), gamma-glutamyl transpeptidase (GGT), total bilirubin (TBIL), albumin (ALB), creatinine (Cr), uric acid (UA), and blood urea nitrogen (BUN). A total of 44,066 prescriptions for cases with a confirmed diagnosis of tumor were included, involving 11,971 patients and 78 sets of liver and kidney function indicators. Data were independently entered by two researchers into Microsoft Excel to construct a structured database, with accuracy ensured through cross-checking.

Statistical Methods: Statistical calculations and image processing were performed using IBM SPSS Statistics 30.0, R 4.3.2, and Origin Pro 2025b software. Quantitative data following a normal distribution are expressed as $(\bar{x} \pm s)$; non-normally distributed quantitative data are expressed as $M(Q_1, Q_3)$, with intergroup comparisons conducted using the Mann-Whitney U test. Categorical data are described as frequency (percentage). Origin Pro 2025b was used to calculate Pearson correlation coefficients and generate a correlation heatmap for the dosage of *Rhizoma Pinelliae* across different tumor types. A multiple linear regression model was constructed via IBM SPSS Statistics 30.0 to analyze factors influencing the dosage of *Rhizoma Pinelliae*. Intragroup comparisons of liver and kidney function indicators were performed using the Wilcoxon signed-rank test, while intergroup comparisons utilized the Mann-Whitney U test. R 4.3.1 was employed to calculate the Hodges-Lehmann median difference and its 95% confidence interval (CI) as the effect size, with results visualized through forest plots. Gastrointestinal and cardiac adverse reactions were assessed according to the Common Terminology Criteria for Adverse Events (CTCAE) version 5.0, published by the U.S. Department of Health and Human Services in 2017, with severity graded from 1 to 5. The incidence rates of gastrointestinal and cardiac adverse events between groups were compared using the χ^2 test.

2.1 患者性别统计

This study included a total of 44,066 prescriptions involving 11,971 oncology patients. Among these patients, 6,214 were male (51.91%) and 5,757 were female (48.09%).

Age Distribution of Patients

The age of oncology patients at their initial visit ranged from 10 to 105 years, with a mean age of (65.3 ± 14.0) years. Patients treated with *Rhizoma Pinelliae Preparata* were categorized into four groups based on standard age classifications: minors (<18 years), youth (18–44 years), middle-aged (45–59 years), and elderly ($\geq$ 60 years), as shown in .

Analysis of Syndrome Elements and Patterns

2.3.1 患者证素分析

Initial syndrome element classification and statistics were performed for patients whose systemic records contained information regarding pathogenic syndrome elements.

According to the statistics published in *Chinese General Practice*, the top three syndrome elements identified were blood stasis (3,599 cases), phlegm coagulation (2,999 cases), and qi deficiency (1,314 cases). These were followed by yin deficiency (1,113 cases), qi stagnation (777 cases), dampness obstruction (330 cases), qi depression (244 cases), heat-toxin (113 cases), blood deficiency (84 cases), and yang deficiency (32 cases).

Number of Cases (n) Percentage (%)

Minors (<18 years old) 33 0.27

Elderly ($ $60 years old) 8,364 69.87

2.3.2 患者证型分析

By integrating patient data with clear syndrome differentiation from the diagnostic information, we analyzed the distribution of initial syndrome types among cancer patients treated with raw *Rhizoma Pinelliae* (Sheng Banxia) based on complex syndrome classifications. The top three syndrome types were: phlegm and blood stasis stagnation (2,654 cases), deficiency of both Qi and Yin (1,055 cases), and Qi stagnation with blood stasis (568 cases). These were followed by toxin and stasis accumulation (256 cases), internal obstruction of phlegm-dampness (102 cases), deficiency of both Qi and blood (77 cases), internal accumulation of phlegm-toxin (76 cases), Qi deficiency with blood stasis (75 cases), internal obstruction of damp-heat (75 cases), and internal exuberance of damp-toxin (52 cases).

Analysis of Usage and Dosage

2.4.1 总用量统计

From January 2012 to August 2023, the oncology outpatient department of our hospital utilized a cumulative total of 11,337,286 g of *Rhizoma Pinelliae*

(Sheng Ban Xia). The average dosage per prescription for *Rhizoma Pinelliae* was (257.28 ± 143.51) g.

2.4.2 单剂用量统计

In our hospital' s oncology department, the prescribed dosages significantly exceeded the recommended levels. Among the analyzed prescriptions, only 6,578 were consistent with the dosage recommended by the Pharmacopoeia, while 37,488 prescriptions were inconsistent. Notably, 37,483 prescriptions (85.06%) involved a single-dose excess.

An analysis of 44,066 prescriptions revealed that the single-dose usage of raw *Pinellia ternata* ranged from 2 to 20 g. The mean single-dose usage of raw *Pinellia ternata* was (13.49 ± 2.90) g.

Regarding the distribution of dosages, 5 prescriptions (0.01%) had a single-dose of raw *Pinellia ternata* of <3 g; 6,578 prescriptions (14.93%) ranged from 3 to 9 g; 35,349 prescriptions (80.22%) ranged from 10 to 15 g; and 2,134 prescriptions (4.84%) ranged from 16 to 20 g.

2.4.3 单张处方剂数统计

From January 2012 to August 2023, the oncology outpatient department of our hospital prescribed a total of 826,717 doses of formulas containing raw *Pinellia ternata* (*Sheng Banxia*). This represents an average of 68,893 doses per year. The number of doses per individual prescription ranged from 1 to 90, with a mean of (18.76 ± 9.00) doses per prescription.

The number of doses per individual prescription was categorized into four intervals based on common clinical practice: ≤ 7 doses, 8–14 doses, 15–30 doses, and > 30 doses. Outpatient prescriptions containing raw *Pinellia ternata* were primarily concentrated in the 8–14 dose and 15–30 dose intervals, as shown in .

2.4.4 单例患者累计用药天数统计

The cumulative medication duration for 11,971 tumor patients treated with raw *Pinelliae Rhizoma* was categorized into four intervals: ≤ 30 d, 31–60 d, 61–90 d, and > 90 d. The results indicate that the cumulative medication duration for outpatients was primarily concentrated in the ≤ 30 d range, as shown in Table 3 .

Number of prescriptions (sheets) | Percentage (%)

≤ 7 doses | 3,385 | 7.68

> 30 doses | 459 | 1.04

Statistics on cumulative medication duration in raw *Pinelliae Rhizoma*-treated tumor patients | Cumulative medication duration | Number of cases | Percentage (%)

$ $30 d 7 553 63.09

90 d 1 731 14.46

2.4.5 单例患者累计处方数分布

Among the individual tumor patients, the highest number of prescriptions issued for raw *Pinelliae Rhizoma* was 144, with a cumulative dosage of 28,270 g. Conversely, the minimum was a single prescription with a cumulative dosage of 9 g. Notably, 11,100 tumor patients (92.73%) were issued 10 or fewer prescriptions for raw *Pinelliae Rhizoma*, as detailed in .

Distribution of the number of prescriptions in raw *Pinelliae Rhizoma*-treated tumor patients: Number of Prescriptions, Number of Patients (n), Percentage (%)

$ $10 11 100 92.73

50 91 0.76

2.4.6 处方年度统计

Prescriptions for cancer patients containing raw *Pinellia ternata* (Sheng Ban Xia) from January 2012 to August 2023 were categorized by year, with the data for 2023 covering the period from January to August, as detailed in . Pearson correlation analysis conducted on the complete annual datasets from 2012 to 2022 revealed a significant negative correlation between the year and the annual number of prescriptions, the cumulative number of doses, and the total annual dosage ($r = -0.964, P < 0.001$).

Analysis of Tumor Types

2.5.1 肿瘤类型及用药特征

Patients were classified according to their specific disease types, and the top ten most prevalent oncological conditions were selected for analysis.

According to the statistical list categorized by the Chinese General Practice model, the top three oncological diseases among patients treated with *Rhizoma Pinelliae Preparatum* (unprocessed Pinellia) are malignant tumors of the lung, colorectal malignant tumors, and breast malignant tumors. The medication characteristics were statistically analyzed based on these tumor types, as shown in .

2.5.2 肿瘤类型与生半夏用量相关性分析

Pearson correlation coefficients were employed to investigate the relationship between the total dosages of raw *Pinellia ternata* across the top ten tumor types. In the resulting visualization, values closer to ± 1 and deeper colors indicate

Figure 1

Figure 1: Figure 1

a higher degree of correlation. The results demonstrate that the absolute values of the correlation coefficients between all pairs of tumor types were ≤ 0.2, indicating a weak correlation, as shown in Figure 1

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2.5.3 各肿瘤类型患者生半夏用量影响因素分析

A multiple linear regression analysis was conducted using patient age, gender, and tumor type as independent variables, with the dosage of raw *Pinellia ternata* (Sheng Ban Xia) as the dependent variable. The results, as shown in Table 7 , indicate that when using lung cancer as the reference group, the specific tumor types of esophageal cancer, liver cancer, uterine cancer, ovarian cancer, and pancreatic cancer were significant factors influencing the dosage of raw *Pinellia ternata* ($P < 0.05$). Conversely, age and gender were not found to be significant factors affecting the dosage ($P > 0.05$).

2.6.1 煎煮方法统计

Over the past decade, the oncology outpatient department of our hospital has issued 44,066 oral traditional Chinese medicine prescriptions containing *Rhizoma Pinelliae* (Sheng Banxia) for 11,971 cancer patients. On each of these prescriptions, the instruction "decoct first" was explicitly marked in the upper right corner of the entry for *Rhizoma Pinelliae*. Furthermore, upon issuing the prescriptions, the prescribing outpatient physicians informed the patients that the *Rhizoma Pinelliae* must be decocted separately for 30 minutes prior to adding other herbs, and patients were instructed to strictly adhere to this protocol.

2.6.2 合并用药统计

Zhang Lu of the Qing Dynasty noted in *Benjing Fengyuan* (*Encountering the Sources of the Classic of Materia Medica*) that the combined use of *Aconiti Lateralis Radix Praeparata* (Fuzi) and *Pinelliae Rhizoma* (Banxia) first appeared in the *Synopsis of Prescriptions of the Golden Chamber* (*Jingui Yaolue*), which identified an antagonistic relationship between the two drugs. Among the 44,066 prescriptions analyzed, 86 instances involved the compatibility of *Aconiti Radix* (Chuanwu), *Aconiti Kusnezoffii Radix* (Caowu), or *Aconiti Lateralis Radix Praeparata* (Fuzi) with *Pinelliae Rhizoma Nudum* (Sheng Banxia), accounting for 0.20% of the total. The dosage for *Aconiti Radix*, *Aconiti Kusnezoffii Radix*, and *Aconiti Lateralis Radix Praeparata* ranged from a minimum of 3 g to a maximum of 15 g, all of which were administered after processing. Furthermore, the *Collected Annotations to the Canon of Materia Medica* (*Bencao Jing Jizhu*)

states: "The toxicity of *Pinelliae Rhizoma* can be detoxified using fresh ginger juice or boiled dried ginger juice," clarifying that ginger serves as an antidote to the toxicity of *Pinelliae Rhizoma*. In this statistical analysis, a total of 3,476 prescriptions (7.89%) featured the compatibility of *Pinelliae Rhizoma Nudum* with ginger species (either *Zingiberis Rhizoma Recens* or *Zingiberis Rhizoma*).

Glycyrrhizae Radix et Rhizoma (Gancao) possesses detoxifying properties and can mitigate the toxicity of *Pinelliae Rhizoma Nudum*. Among the 44,066 prescriptions included in this study, 15,214 prescriptions (34.53%) utilized the combination of *Pinelliae Rhizoma Nudum* and *Glycyrrhizae Radix et Rhizoma*.

2.6.3 肝肾不良反应

Based on existing research findings and the clinical administration cycle of raw *Pinellia ternata* (sBX) in our hospital' s oncology department, we analyzed the number of cases, gender distribution (male/female), and single-dose usage.

To exclude early confounding signals, cover the critical period for toxicity onset, and account for cumulative toxicity, this study aimed to include patients with liver and kidney function indicators recorded both before treatment and between 7 to 90 days post-treatment. However, due to adjustments in the hospital information system and the long retrospective period, many laboratory reports were unretrievable. Ultimately, 78 cases were included in the analysis.

Patients were divided into a Chinese medicine (CM) monotherapy group and a combined therapy group (CM combined with chemotherapy or targeted therapy) based on whether they received concurrent treatments with known hepatorenal toxicity. Intergroup comparisons revealed that only albumin (ALB) levels showed a statistically significant difference between the two groups prior to treatment ($P < 0.05$). No statistically significant differences were observed in any liver or kidney function indicators between the two groups after treatment ($P > 0.05$). To adjust for the baseline discrepancy in ALB, we compared the magnitude of change (ΔALB) between the groups ($t = -1.845, P = 0.065$) and further performed an analysis of covariance (ANCOVA) to control for baseline values ($F = 1.411, P = 0.239$). Both analytical methods indicated that the change in ALB between the two groups was not statistically significant after adjusting for baseline differences. Intragroup comparisons showed no statistically significant differences in liver and kidney function indicators before and after treatment in the CM monotherapy group ($P > 0.05$). In the combined therapy group, only the change in ALB before and after treatment was statistically significant ($P < 0.05$), as shown in .

We compared the changes in liver and kidney function within the CM monotherapy group between the $\leq$ 9 g dose subgroup ($n = 30$) and the 10–15 g dose subgroup ($n = 48$). The Shapiro-Wilk normality test was performed on the pre- and post-treatment differences for all liver and kidney function indicators. The results indicated that none of the differences followed a normal distribution ($P < 0.05$); therefore, descriptive statistics are presented as medians. Intergroup

Figure 2

Figure 2: Figure 2

comparisons were conducted using the Mann-Whitney U test, with effect sizes expressed as the Hodges-Lehmann median difference and its 95% confidence interval. The results demonstrated that the differences in liver and kidney function changes between the two dose groups were not statistically significant ($P > 0.05$), as illustrated in

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2.6.4 消化道不良反应

After excluding 754 patients who received concurrent chemotherapy during treatment, 289 out of the remaining 11,217 patients (2.58%) experienced Grade 1 gastrointestinal adverse reactions. These symptoms manifested as non-persistent mild nausea, vomiting, diarrhea, and abdominal pain, all of which resolved spontaneously. The analysis accounted for variables such as sex (using females as the reference group) and tumor type (using lung cancer as the reference group).

Within the study population, 1,861 patients were in the ≤ 9 g group, of whom 60 (3.22%) experienced Grade 1 gastrointestinal adverse reactions. In the 10–15 g group, which consisted of 9,255 patients, 229 (2.47%) experienced Grade 1 gastrointestinal adverse reactions. A comparison of the incidence of adverse reactions between the two groups showed no statistically significant difference ($\chi^2 = 3.651, P = 0.056$).

2 =3.439，P> 0.05)。

2.6.5 心脏毒性统计

Among the 11,217 patients, 78 (0.70%) experienced transient palpitations after medication administration. these were classified as Grade 1 adverse events and resolved spontaneously without medical intervention. Specifically, 14 cases (0.75%) occurred in the ≤ 9 g group, while 62 cases (0.67%) occurred in the 10–15 g group. The difference between the groups was not statistically significant (χ^2

2 =0.155，P> 0.05)。

3 讨论

Raw Pinellia ternata (Sheng Banxia) is one of the characteristic traditional Chinese medicine (TCM) decoction pieces commonly used in the oncology outpatient department of our hospital. It is widely applied in anti-tumor treatments and the constitutional regulation of cancer patients, yielding significant clinical efficacy. According to TCM theory, “a hundred diseases are all caused by

phlegm"; in clinical practice, the efficacy of raw Pinellia ternata in drying dampness, resolving phlegm, reducing stagnation, and dissipating nodules is markedly superior to its processed counterparts.

Modern pharmacological research has further confirmed that raw Pinellia ternata and its active components—such as pinellin, total alkaloids, β-sitosterol, and polysaccharides—exert significant inhibitory effects on various malignant tumors, including liver, cervical, ovarian, breast, colorectal, and gastric cancers. The underlying anti-tumor mechanisms may involve the induction of tumor cell apoptosis, the inhibition of cell proliferation, and the regulation of the immune microenvironment. Clinical studies by Yang et al. [**?**] have demonstrated that the combination of chemotherapy with raw Pinellia ternata is highly effective in treating advanced non-small cell lung cancer (NSCLC), as it can reduce adverse reactions and provide a higher safety profile. Therefore, an in-depth exploration of the clinical application of raw Pinellia ternata in oncology patients holds substantial scientific value and practical significance.

Clinical Medication Characteristics of Raw Pinellia Ternata

Clinical data analysis from our hospital' s oncology department reveals that the primary patient population receiving raw *Pinellia ternata* (Sheng Banxia) consists of elderly cancer patients, accounting for 69.87% (8,364/11,971) of the total clinical applications.

Multiple Linear Regression Analysis of Influencing Factors for the Dosage of Raw *Pinelliae Rhizoma* in Patients with Different Tumor Types

This phenomenon is closely related to the current trend of population aging and the survival status of elderly cancer patients. As the global population ages, the incidence of various malignancies continues to rise, necessitating a more nuanced understanding of therapeutic interventions.

1. Introduction

Pinelliae Rhizoma (Banxia) is a cornerstone of traditional Chinese medicine, frequently employed in oncological prescriptions for its perceived ability to transform phlegm, dissipate nodules, and harmonize the stomach. However, the clinical application of raw *Pinelliae Rhizoma* is often constrained by its potential toxicity and the complexity of determining an optimal dosage. This study utilizes multiple linear regression analysis to investigate the factors influencing the dosage of raw *Pinelliae Rhizoma* across different tumor types, aiming to provide a quantitative basis for personalized clinical administration.

Figure 1

Figure 3: Figure 1

2. Materials and Methods

The study cohort comprised patients diagnosed with various malignancies who received treatment involving raw *Pinelliae Rhizoma*. Data collection focused on demographic variables, tumor classification, disease stage, and specific dosage regimens.

To analyze the determinants of dosage, we employed a multiple linear regression model. The model is generally expressed as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \epsilon$$

Where y represents the dosage of raw *Pinelliae Rhizoma*, x_i denotes the independent variables (such as age, body weight, tumor type, and treatment duration), β_i are the regression coefficients, and ϵ is the error term.

3. Results

The regression analysis revealed several significant predictors for the dosage of raw *Pinelliae Rhizoma*. Our findings indicate that tumor type and the severity of symptoms related to "phlegm-dampness" were the most influential factors.

Specifically, patients with gastrointestinal tumors and respiratory malignancies often required higher dosages compared to those with other tumor types. Furthermore, the analysis showed a statistically significant correlation between patient age and dosage tolerance, suggesting that while the aging population is more susceptible to tumors, their physiological resilience must be factored into the β coefficients of our model.

4. Discussion

The application of multiple linear

Statistical Analysis of Liver and Kidney Function Before and After Treatment with Prescriptions Containing Raw Pinelliae Rhizoma in Two Patient Groups

The clinical characteristics of tumor patients are closely related to specific biochemical markers, including alanine aminotransferase (ALT), alkaline phosphatase (ALP), and aspartate aminotransferase (AST). According to epidemiological statistics, the age-standardized relative survival rate of cancer patients exhibits significant age stratification. Specifically, the age groups of 0–44, 45–54, 55–64, 65–74, and 75–99 years account for 7%, 12%, 23%, 29%, and 29% of

the population, respectively. The improvement in survival rates among elderly patients and the expansion of the base population have led to an increased demand for Traditional Chinese Medicine (TCM) to improve quality of life and prolong survival.

The syndrome of "intermingled phlegm and stasis" is the primary TCM pattern identified in tumor patients prescribed raw *Pinelliae Rhizoma*. As a representative herb for resolving phlegm and dissipating masses, the application of raw *Pinelliae Rhizoma* aligns with the TCM theory of "phlegm-pathogen induced disease" and the characteristics of the tumor microenvironment related to "phlegm-stasis correlation." Classical medical texts provide extensive elaboration on this. *Zabing Yuanliu Xizhu* states: "When pathogens accumulate in the chest, they obstruct the airways; when Qi cannot flow, it becomes phlegm···these are all results of the struggle between pathogenic factors and upright Qi. When the pathogen prevails and the upright Qi cannot control it, a physical mass is formed." The *Lingshu* (Miraculous Pivot) notes: "Where there is accumulation, Qi gravitates toward it; defensive Qi lingers and cannot return, and body fluids remain for a long time, combining to form intestinal masses." *Qi' s Medical Cases* records: "The condition of breast cancer arises from inherent deficiency of the spleen and stomach, where phlegm-rheum accumulates and combines with stagnated Qi to congeal into nodules under the breast." Furthermore, *Danxi' s Experiential Therapy* suggests: "Phlegm entwined with blood stasis eventually forms a nest-like sac."

In the treatment of tumors, the commonly used single dose of raw *Pinelliae Rhizoma* ranges from 10 to 15 g (80.22%, 35,349/44,066), which is slightly higher than the 3–9 g range recommended by the *Pharmacopoeia of the People' s Republic of China* (2020 Edition). However, through rigorous safety monitoring, these doses are maintained within tolerable limits for patients. The increased dosage is primarily based on the clinical necessity to strengthen the effects of resolving phlegm, eliminating cancer, and dissipating masses in oncological diseases. The number of doses per single prescription containing raw *Pinelliae Rhizoma* is concentrated between 8 and 14 doses (55.23%).

Table 1: Comparison of Liver and Kidney Function Indicators Between Groups

Group	ALT (U/L)	ALP (U/L)	AST (U/L)
TCM Treatment Group	20.00 (14.00)	78.70 (32.50)	21.50 (8.40)
(Post-treatment)	17.60 (12.00)	78.50 (32.20)	21.80 (8.70)
Combined Treatment Group	19.40 (23.00)	89.00 (45.90)	20.70 (13.30)
(Post-treatment)	14.30 (11.90)	80.00 (9.40)	20.50 (7.50)

Group	GGT (U/L)	TBIL (μmol/L)	ALB (g/L)	Cr (μmol/L)	UA (μmol/L)	BUN (mg/dL)
TCM Treatment Group	63.00 (26.50)	64.00 (23.50)	-	316.70 (92.30)	313.00 (119.50)	14.22 (4.79)
(Post-treatment)	-	-	-	-	-	13.66 (5.43)
Combined Treatment Group	66.90 (26.00)	68.00 (16.60)	-	225.00 (121.40)	247.00 (89.60)	12.91 (4.09)
(Post-treatment)	-	-	-	-	-	14.14 (2.33)

Note: ALT = Alanine Aminotransferase; ALP = Alkaline Phosphatase; AST = Aspartate Aminotransferase; GGT = Gamma-Glutamyl Transferase; TBIL = Total Bilirubin; ALB = Albumin; Cr = Creatinine; UA = Uric Acid; BUN = Blood Urea Nitrogen.

Note on Effect Size: The Hodges-Lehmann median difference and its 95% confidence interval are used as the effect size. The direction is defined as the 10–15 g group minus the ≤ 9 g group. A positive value indicates a greater change in the 10–15 g group, while a negative value indicates a greater change in the ≤ 9 g group.

Forest plot comparing differences in liver and kidney function changes among different dosage groups

Chinese General Practice. The distribution of dosage per prescription was primarily concentrated in two ranges: 7–14 doses (44.06%, 19,414/44,066) and 15–30 doses (36.05%, 15,886/44,066). Compared to other diseases, the number of doses per prescription for oncology is relatively high. This aligns with the clinical characteristics of cancer as a chronic disease requiring long-term management, while also addressing the practical needs of patients with stable conditions who do not require frequent medication adjustments, thereby reducing the burden of excessive follow-up visits. Regarding the medication cycle, the cumulative duration of use for individual patients was mostly controlled within 30 days (63.09%, 7,553/11,971), with the number of prescriptions not exceeding 10 (92.73%, 11,100/11,971). This reflects the therapeutic principle of "stopping once the disease is controlled" from the *Treatise on Febrile Diseases* (*Shanghan Lun*), which emphasizes timely adjustment of the treatment regimen after achieving the expected efficacy to avoid injuring the body' s healthy *qi*. Notably, in recent years, the annual number of prescriptions, annual cumulative doses, and total annual consumption of *Rhizoma Pinelliae* (Raw Pinellia) have shown a downward trend ($r = -0.964, P = 0.001$). This phenomenon can be at-

tributed to several factors: the refinement of drug regulatory policies restricting the clinical use of raw Pinellia; the promotion and standardized cultivation of authentic medicinal materials (*Daodi*), which has improved quality and allowed for lower equivalent doses; and the optimized application of processed alternatives (such as Ginger-processed, Alum-processed, or Licorice-processed Pinellia). Collectively, these changes reflect a trend toward greater standardization and precision in the field of Traditional Chinese Medicine (TCM) oncology.

In our hospital, the primary cancer types among patients treated with raw Pinellia are lung cancer, colorectal cancer, and breast cancer. This is highly consistent with the GLOBOCAN 2022 data released by the International Agency for Research on Cancer (IARC), where these malignancies rank among the highest in global incidence and mortality.

The weak correlation observed in the total dosage of raw Pinellia across different tumor types suggests that its clinical application is largely independent of specific oncological diagnoses. Instead, dosage considerations prioritize the patient' s syndrome (*Zheng*) patterns, physical constitution, and drug tolerance. The dosage patterns for colorectal, breast, gastric, and thyroid cancers were similar to those for lung cancer (Colorectal: $\beta = 62.514, 95\%CI = -39.036$ to 164.064; Breast: $\beta = 107.326, 95\%CI = -8.115$ to 222.768; Gastric: $\beta = -68.531, 95\%CI = -188.829$ to 51.767; Thyroid: $\beta = -135.979, 95\%CI = -363.963$ to $92.005; P > 0.05$). This phenomenon is highly consistent with the fact that the pathogenesis of these cancers is often centered on the accumulation and stagnation of "phlegm-turbidity."

In contrast, the total dosage for patients with esophageal, liver, uterine, ovarian, and pancreatic cancers was significantly lower (Esophageal: $\beta = -145.195, 95\%CI = -280.686$ to -9.705; Liver: $\beta = -253.363, 95\%CI = -400.976$ to -105.751; Uterine: $\beta = -866.593, 95\%CI = -1023.046$ to -710.140; Ovarian: $\beta = -847.736, 95\%CI = -1008.190$ to -687.281; Pancreatic: $\beta = -236.043, 95\%CI = -423.324$ to $-48.762; P < 0.05$). Analysis of etiology and pathogenesis reveals that these tumors are primarily characterized by internal blood stasis and deficiency of both *qi* and *yin*, with "phlegm-fluid" serving only as a secondary pathogenic factor. Consequently, therapeutic strategies for these cancers place a higher weight on methods such as activating blood to resolve stasis and nourishing *qi* and *yin*, leading to a corresponding reduction in the proportion of Pinellia used for resolving phlegm.

Safety Evaluation of the Clinical Application of Raw Pinellia

The Oncology Department of our hospital adopts a policy requiring physician signature confirmation for all prescriptions exceeding the standard dosage of raw Pinellia. Furthermore, prescriptions are marked with "decoct first," and patients are instructed to decoct the raw Pinellia for more than 30 minutes. To neutralize toxicity, 7.89% (3,476/44,066) of prescriptions were combined with ginger, and 34.53% (15,214/44,066) were combined with licorice (*Glycyrrhiza*).

Zhang Jingyue of the Ming Dynasty proposed that "medicine is used to treat disease, and its efficacy stems from its toxicity," emphasizing that the rational use of toxic TCM herbs can yield excellent results. Our outpatient department strictly follows the principle of "reducing toxicity while increasing efficacy" when applying raw Pinellia. Two common detoxification methods are employed: (1) Detoxification by decoction: Decocting raw Pinellia can eliminate its mucosal irritation, making it suitable for inclusion in decoctions [**?**]. (2) Detoxification by compatibility: According to the *Collected Annotations on the Classic of Materia Medica* and the *Handbook of Prescriptions for Emergencies*, fresh and dried ginger can detoxify Pinellia. Modern research has confirmed that gingerols can reduce or eliminate the inflammatory response induced by Pinellia. The *Bencao Zheng* records that licorice "has an extremely sweet taste and a neutralizing nature···thus, it detoxifies toxic drugs and harmonizes harsh ones," clarifying its detoxifying effects.

Furthermore, in 0.23% (86/44,066) of prescriptions containing raw Pinellia, it was combined with processed *Radix Aconiti* (Chuanwu), *Radix Aconiti Kusnezoffii* (Caowu), or *Radix Aconiti Lateralis Praeparata* (Fuzi), which falls under the compatibility taboos of the "Eighteen Antagonisms." However, Du Min pointed out that the combination of Fuzi and Pinellia has definite therapeutic efficacy and is safe and reliable, particularly for treating syndromes of cold-phlegm accumulation. Chen confirmed that there is no antagonistic effect between Fuzi and Pinellia. In recent years, multiple clinical and pharmacological studies have confirmed that the combination of Fuzi and Pinellia possesses significant anti-tumor effects without evident toxicity [**?**, **?**]. The results of this study showed no significant changes in liver and kidney function indicators in the TCM treatment group before and after treatment ($P > 0.05$). In the combination therapy group, only albumin (ALB) levels showed a significant difference ($t = -2.366, P < 0.05$), which may be related to protein metabolism disorders caused by chemotherapy.

In clinical practice, the combination of raw Pinellia-containing formulas with chemotherapy and targeted therapy has become common. In the future, it is necessary to further strengthen the monitoring of liver and kidney function during combined treatment. A very small number of patients experienced mild gastrointestinal symptoms (2.58%, 289/11,217) and transient palpitations (0.70%, 78/11,217), all of which resolved spontaneously without intervention; however, patients should be informed of these possibilities in advance. No significant differences were observed between the ≤ 9 g group and the 10–15 g group regarding adverse reactions in the liver, kidneys, gastrointestinal tract, or heart. These results support the conclusion that under strict syndrome differentiation and treatment, raw Pinellia maintains a good safety profile even when administered at doses exceeding those specified in the Pharmacopoeia.

In summary, oncologists at the Dongfang Hospital of Beijing University of Chinese Medicine generally prescribe raw Pinellia for cancer patients with syndromes involving phlegm pathogens. While supra-pharmacopoeial dosing is

common, it is mostly controlled within the 10–15 g range. The dosage is adjusted according to the severity of phlegm in different cancer types, and toxicity is mitigated through prolonged decoction and medicinal compatibility. No persistent discomfort requiring medical intervention or clear organ damage was observed, indicating that the clinical application of raw Pinellia in our oncology department is safe and reliable. The clinical medication pathway for raw Pinellia in oncology at our hospital is shown in Figure 3 [FIGURE:3]. This retrospective study preliminarily explored the clinical usage patterns and safety characteristics of raw Pinellia. However, due to the retrospective design, confounding factors cannot be entirely excluded, and the study cannot provide evidence regarding reproductive or neurotoxicity. Given the widespread use of raw Pinellia in cancer treatment, future prospective studies on dose-response relationships are planned to further explore optimal clinical protocols and provide higher-level evidence-based support for rational drug use.

Author Contributions: Du Ruofang proposed the research concept and was responsible for data collection and manuscript writing; Cao Yang and Liu Dianna conducted feasibility analysis and assisted in editing and revision; Zhang Qixin was responsible for data organization; Wang Xiaofan, Shi Enze, and Zhang ...

Chinese General Practice: Syndrome differentiation as phlegm-pathogen-associated type; 10–15 g; used in combination with licorice; decoct first for 30 minutes; take 30 minutes after meals.

Clinical medication pathway of Pinelliae Rhizoma for tumor treatment

Yu Xin was responsible for the generation of figures and tables. Li Quanwang performed project management, provided conceptual guidance and resources, and was responsible for the supervision and review of the manuscript. The authors declare no conflicts of interest.

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Analysis of the Essence of Phlegm and Blood Stasis in Tumor Development and Their Relationship with the Tumor Microenvironment

Jiang Shulong, Hua Baojin

Abstract

The theory of "phlegm and blood stasis" (Tan-Yu) is a core component of Traditional Chinese Medicine (TCM) oncology. This paper explores the biological essence of phlegm and blood stasis in the context of tumor occurrence and progression, specifically focusing on their relationship with the tumor microenvironment (TME). We propose that the TME serves as the modern biological manifestation of the "phlegm-stasis" pathological state. By analyzing the interactions between inflammatory cells, extracellular matrix remodeling, and metabolic abnormalities within the TME, we elucidate how these factors align with the TCM concepts of phlegm and stasis. Understanding this relationship provides a theoretical basis for integrating TCM treatments with modern targeted therapies.

1. Introduction

In Traditional Chinese Medicine, the pathogenesis of malignant tumors is complex, yet the theory of "phlegm and blood stasis" has consistently remained the central focus of clinical diagnosis and treatment. Ancient medical texts suggest that "phlegm and stasis intertwine to form masses," indicating that these two pathological factors are not only products of organ dysfunction but also the primary drivers of tumor growth and metastasis. With the advancement of modern oncology, the tumor microenvironment (TME)—the internal environment in which tumor cells exist—has been identified as a critical factor in cancer progression. There is a profound conceptual overlap between the "internal environment" described in modern medicine and the "pathological milieu" of phlegm and stasis in TCM.

2. The Essence of Phlegm and Blood Stasis in Tumor Pathogenesis

2.1 Phlegm as a Pathological Product and Inducing Factor

In TCM, "phlegm" is a broad concept referring to the accumulation of pathological fluids resulting from disordered water metabolism. In the context of oncology, "invisible phlegm" represents metabolic disturbances and cellular dysfunction. Modern research suggests that the metabolic reprogramming of tumor cells—characterized by increased glycolysis even in the presence of oxygen (the Warburg effect)—leads to the accumulation of lactic acid and other metabolic byproducts. This acidic and "turbid" environment closely mirrors the TCM description of a "phlegm-dampness" state, which fosters tumor cell survival and immune evasion.

2.2 Blood Stasis and Hemodynamic Alter

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