Study on the Law of Traditional Chinese Medicine Use of Pancreatic Cancer Based on Data Mining

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Abstract: Based on the data mining technology, to mine and analyze the core prescriptions and compatibility rules of the treatment of pancreatic cancer in the journal literature, so as to provide the basis for the differentiation and treatment of pancreatic cancer. Methods: all traditional Chinese medicine prescriptions for the treatment of "pancreatic cancer" and "pancreatic head cancer" were retrieved from the database of CNKI. The database was established by WPS excel 2019 for frequency analysis, and the high-frequency drug properties and meridian related analysis were carried out by SPSS Clementine 12.0 software. Results: 114 prescriptions of traditional Chinese medicine were screened out, involving 162 prescriptions of traditional Chinese medicine, and 54 prescriptions of high frequency drugs (≥ 10 times) were obtained. It is mainly composed of heat clearing medicine and tonic medicine. Its sexual taste is mainly composed of warm, calm and cold. The most of them are liver and spleen meridians. The core drugs for pancreatic cancer were Poria cocos, Atractylodes macrocephala, dangshen, Pinellia ternate, tangerine peel, liquorice, Astragalus membranaceus and Hedyotis diffusa. And get pinellia, Atractylodes macrocephala, Poria, temperature, Xin, spleen, Xin, Gan, bitter and other drugs, performance combination. Conclusion: through this study, it is reflected that the treatment of pancreatic cancer should be mild and gentle, and at the same time, it should take into account the spleen and stomach transportation, supporting Qi, emphasizing that TCM should pay attention to the combination of disease and syndrome differentiation in the treatment of pancreatic cancer, which can provide clinical basis for the prescription of pancreatic cancer.

Keywords: Pancreatic Cancer; Traditional Chinese Medicine; Data Mining; Medication Prescription

1. Introduction

Pancreatic cancer (PC) is a serious disease caused by abnormal cells in the pancreas that divide and grow uncontrollably, forming tumors [1]. Its insidious onset and rapid progression make it a highly malignant gastrointestinal tumor [2], with a 5-year survival rate of less than 6% [3]. In China, new cases of pancreatic cancer account for 19.45% of all newly diagnosed pancreatic cancer cases and 19.27% of all pancreatic cancer deaths, with the mortality rate almost equal to the incidence rate [4]. Although TCM is not clearly indicated for pancreatic cancer, with the development of TCM not only, numerous clinical data show that TCM has some advantages in treating pancreatic cancer, which can reduce the burden of patients' families, improve their pain, reduce the adverse effects after surgery or chemotherapy, and prolong the survival period. The prevalence of pancreatic cancer is increasing year by year in China, and it is important to identify high-risk groups as well as appropriate treatment and prevention.

2. Information and methods

2.1. Source of information

All the required literature for this study was obtained from the China Journal Full Text Database (CNKI).

2.2. Earch Strategy

Enter the main page of CNKI and select "Advanced Search", select "Topic" as the search item, and search by "pancreatic cancer", "pancreatic tumor "pancreatic cancer", "pancreatic tumor" and "pancreatic head cancer". In the search results, select "keywords" and enter "Chinese medicine" or "traditional Chinese medicine" to search for relevant literature.

2.3. Research Methodology

2.3.1. Establishment of database

Establishing the database The WPS office Excel was used to include all prescription compositions for statistical purposes, and to organize the drug names, properties, ascriptions, and effects to establish the database. To ensure the accuracy of the data, one person was used to enter and two people checked and verified the original literature data entered to ensure no errors.

2.3.2. Data processing

(1) The frequency statistics of high-frequency drugs and the descriptive statistics of the taste, aptitudes, and efficacy of the drugs were performed using Excel tables. (2) SPSS Clementine 12.0 software was used to perform correlation analysis of the selected prescriptions of drugs, the nature and taste of high-frequency drugs, and the type of efficacy with the Apriori module, respectively.

3. Results

A total of 98 literatures meeting the criteria were collected and collated, and a total of 94 literatures were included, with 114 prescriptions involving 162 flavors of Chinese medicines and a total of 1712 drug frequencies.

3.1. Frequency of high-frequency drugs

The frequency and frequency statistical analysis of high-frequency drugs (used more than 10 times) among 162 Chinese medicines appearing in all prescriptions yielded 53 flavors, of which the top 10 Chinese medicines with the highest frequency were: Atractylodes macrocephala, Poria cocos, Rhizoma alba, Radix Codonopsis pilosulae, Radix et Rhizoma yanhusuo, Semen coix, Radix et Rhizoma pilosulae, Radix et Rhizoma glycyrrhizae and Radix et Rhizoma astragali. (Table 1)

Table 1: Statistics of commonly used drugs with a frequency greater than 10 times in the prescription

Serial number	Chinese medicine name	Frequency (times)	Frequency (%)	Serial number	Chinese medicine name	Frequency (times)	Frequency(%)
1	Atractylodes macrocephala	63	55.26	28	Tulip	19	16.67
2	Poria cocos	55	48.25	29	Hawthorn	19	16.67
3	White Flower and Snake Tongue	46	40.35	30	Peach kernel	17	14.91
4	Radix Codonopsis	41	35.96	31	Tiger Cane	17	14.91
5	Yanhuosuo	40	35.09	32	Trigonella	16	14.04
6	Job's Tears	38	33.33	33	Cardamom	15	13.16
7	Radix et Rhizoma	38	33.33	34	Big Belly Bark	15	13.16
8	Radix Bupleurum	37	32.46	35	Goldenseal	14	12.28
9	Licorice	36	31.58	36	Ginseng	14	12.28
10	Astragalus	35	30.70	37	Poria	14	12.28
11	White Peony	35	30.70	38	Mullein	14	12.28
12	Radix et Rhizoma Umbelliflorum	35	30.70	39	Swollen Wind	13	11.40
13	Rhubarb	35	30.70	40	Hou Pu	13	11.40
14	August Zha	34	29.82	41	Xia Gu Cao Cao	13	11.40
15	Semen lotus	30	26.32	42	Panganax	13	11.40
16	Chen Pi	30	26.32	43	Panax ginseng	13	11.40
17	Radix Angelicae Sinensis	29	25.44	44	Chicken Blood Vine	13	11.40
18	Red Peony	25	21.93	45	Plantago ovata	12	10.53
19	Curcuma longa	24	21.05	46	Citrus aurantium	12	10.53

20	Danshen	24	21.05	47	Peony Bark	12	10.53
21	Neem	23	20.18	48	Citrus aurantium	12	10.53
22	Malt	22	19.30	49	Safflower	12	10.53
23	Baicalin	22	19.30	50	Garcinia Cambogia Root	12	10.53
24	Shen Qu	21	18.42	51	Radix Rehmanniae	12	10.53
25	Gardenia jasminoides	21	18.42	52	Ganoderma lucidum	11	9.65
26	Chickweed	20	17.54	53	Tiannanxing	11	9.65
27	Radix Aromaticus	19	16.67				

3.2. Frequency of high-frequency drug classifications

Drug efficacy The 162 herbal medicines involved can be divided into 18 categories according to their efficacy, among which the five most frequent categories are: heat-clearing medicines (31 flavors 224 times), tonic medicines (29 flavors 375 times), blood-stasis invigorating medicines (20 flavors 254 times), water-releasing and dampness-permeating medicines (13 flavors 211 times), and qi-regulating medicines (11 flavors 150 times). They accounted for 73.59% of the total frequency of use, with tonic drugs taking the first place, accounting for 20.85%. (Table 2)

Table 2: Drug efficacy frequency and frequency statistics

Drug Class	Taste Number	Frequency (times)	Frequency(%)	Average frequency(times)
Tonic category				
Qi tonics	11	224	13.08	20
Yin tonics	9	46	2.69	5
Blood tonics	5	76	4.44	15
Yang tonics	4	11	0.64	3
Clearing heat	31	288	16.82	9
Promoting blood circulation and removing blood stasis	20	254	14.84	13
Diuresis and Dampness Relief	13	211	12.32	16
Relieving Qi	11	150	8.76	14
Eliminating food	6	87	5.08	15
Clearing phlegm, relieving cough and asthma	11	82	4.79	7
Anti-epidemic agents	7	63	3.68	9
Diuretics	4	44	2.57	11
Clearing dampness	4	43	2.51	11
Blood-stoppers	5	33	1.93	7
Calming the liver and quenching the wind	5	27	1.58	5
Warming medicines for the interior	4	17	0.99	4
Dispelling wind and dampness	4	17	0.99	4
Astringents	3	13	0.76	4
Tranquilizers	2	13	0.76	7
Toxic and insecticidal	2	10	0.58	5
Anthelmintics	1	3	0.18	3
Total	162	1712	1.00	11

3.3. Frequency of high-frequency "four qi" and "five wei"

Table 3: Frequency and frequency statistics of drug pharmacological properties

Pharmaceutical properties	Number of herbal medicines appearing	Frequency (times)	Frequency (%)
Warm	41	465	27.47
Ping	33	369	21.80
Cold	39	356	21.03
Slightly Cold	25	304	17.96
Slightly warm	12	110	6.50
Cool	7	73	4.31
Hot	4	16	0.94

Drug properties All drugs involved a total of 8 medicinal properties, mainly warm, flat, cold, slightly cold, slightly cold is classified as cold, slightly warm is classified as warm, and hot is classified as hot, then the frequency of drug "four qi" in order of cold (64 flavors 38.99%), warm (53 flavors 33.52%), flat (33 flavors 21.80%), cool (7 flavors (4.31%), and hot (4 flavors 0.94%), as shown in

Table 3. Based on the drug taste, slightly bitter, slightly sweet, and astringent were classified as bitter, sweet, and astringent, respectively, then according to the frequency of taste frequency in order: bitter (77 flavors 52.22%), sweet (79 flavors 49.32%), pungent (57 flavors 37.15%), sour (21 flavors 9.51%), salty (18 flavors 5.91%), and light (7 flavors 7.44%). Mainly sweet, bitter and pungent were dominant, as shown in Table 4.

Table 4: Frequency and frequency statistics of drug taste

medicinal taste	Number of Chinese medicines	Frequency (times)	Frequency (%)
Sweet	78	816	48.20
pain	67	744	43.95
Pungent	57	629	37.15
Slightly bitter	10	140	8.27
Sour	15	126	7.44
Mild	7	126	7.44
Salty	18	100	5.91
Astringent	6	35	2.07
Slightly sweet	1	19	1.12

3.4. Frequency of high-frequency Meridians

Table 5: Frequency and frequency statistics of drug reversion to menstruation

Return to the meridian	Number of herbal medicines appearing	Frequency (times)	Frequency (%)	Return to the meridian	Number of herbal medicines appearing	Frequency (times)	Frequency (%)
Spleen	66	980	24.45	Bile	19	243	6.06
Liver	90	898	22.41	Large Intestine	18	203	5.06
Stomach	60	662	16.52	Small Intestine	11	179	4.47
Lung	58	657	16.39	Bladder	13	114	2.84
Heart	42	473	11.80	San Jiao	3	54	1.35
Kidney	44	338	8.43	Heart Pericardium	4	52	1.30

Drug meridians based on the drug meridians, the frequency statistics of 162 herbal medicines were counted separately because some drugs could have different meridians. The results showed that according to the frequency of use, the spleen meridian (66 flavors 980 times) and liver meridian (90 flavors 898 times) were the most frequently used, followed by the stomach meridian (60 flavors 662 times) and lung meridian (58 flavors 657 times). (Table 5)

4. Discussions

There is no record of "pancreatic cancer" in Chinese traditional medicine, but it can be classified as "zhengzheng", "accumulation", "xanthogranuloma" and "fulang" according to clinical symptoms and signs [5]. According to the clinical symptoms and signs, it can be classified as "obstruction", "accumulation", "yellow gangrene" and "fulang" [6]. The etiology and pathogenesis of pancreatic cancer are only based on clinical symptoms for identification and treatment. The etiology and pathogenesis of pancreatic cancer can be summarized as disorders of the seven emotions, liver qi stagnation, and unrestrained qi flow, or injury to the spleen and stomach due to dietary disorders, wanton eating of fatty foods, alcoholic wine and thick flavors, etc., and the internal growth of dampness and heat, which causes dampness and heat poisonous evil to damage the body as a result of depression and heat [7]. In recent years, there has been a new understanding of the etiology and pathogenesis of pancreatic cancer, and pancreatic cancer has been treated with the methods of supporting the righteousness and suppressing cancer [8], clearing heat and resolving accumulation [9], warming Yang and resolving dampness [10], benefiting Qi and invigorating Blood [10], and benefiting Qi and strengthening the spleen to resolve stasis [11], and some clinical progress has been made. The pathological factors of this disease are many, the pathogenesis is complex, and the Chinese medical evidence is diverse, and each doctor has different ideas on the use of drugs, so the clinical selection and use of drugs are complex and variable, so the selection and combination rules of drugs are worth studying.

In the present study, 114 formulas were analyzed by data mining, and from the frequency of use statistics, among the 162 herbs involved, 53 herbs were used more than 10 times, and the top 10 were Atractylodes macrocephala, Poria cocos, Radix et Rhizoma alba, Radix et Rhizoma ginseng, Coix lacrymae, Radix semen, Radix bupleurum, Radix glycyrrhiza, Radix astragali, Radix et Rhizoma

paeoniae, Radix et Rhizoma lucidum and Rhizoma rhubarb. Among them, Atractylodes macrocephala has the efficacy of strengthening the spleen, benefiting qi, drying dampness, and promoting water circulation, and is used most frequently; followed by Fu Ling, which is used for promoting water circulation and dampness, strengthening the spleen, and nourishing the heart; and Bupleurum album, which is used for clearing heat and detoxifying toxins and promoting dampness and laxative. In terms of the classification of the efficacy of drugs, the top five in terms of frequency of use were: tonics, heat-clearing drugs, blood-stasis-activating drugs (14.85%), water-releasing and damp-permeating drugs, and qi-regulating drugs. Among the ten most frequently used drugs, tonic drugs accounted for nearly half of them, followed by heat-clearing drugs, blood-stasis-activating drugs, and water-dampness-diffusing drugs. The blood circulation and elimination of dampness are commonly used by Poria, Poria, Yin Chen, Tiger Balm, Money Grass, etc.; the qi management drugs are commonly used by Chen Pi, Chuan Neem, Aromatic Herb and Big Belly Bark. From the data mining analysis of the nature and meridian of the drugs, the most frequent use of the warm and sweet drugs, followed by flat, cold, bitter and pungent, and the meridian of the liver and spleen, followed by heart, stomach and lung. Modern medicinal properties and efficacy [12] show that the combination of warm, sweet, bitter, pungent, cold and liver and spleen has the effects of benefiting qi, dispelling dampness, dispersing blood stasis and relieving pain, benefiting essence and blood, and softening hardness and dispersing knots. This also coincidentally reflects the pathomechanical characteristics of pancreatic cancer with a mixture of deficiency and reality. Zhang Juan et al. [13] analyzed the symptoms of pancreatic cancer and showed that the most common types of pancreatic cancer are Qi stagnation and Blood stasis, Damp-Heat encapsulation, Damp-Heat and Poison encapsulation, Spleen deficiency and Damp-Heat, and Qi and Blood deficiency, and analyzed the literature to conclude that pancreatic cancer is located in the spleen (spleen-stomach), followed by the liver (liver-biliary). From this analysis, it is clear that the treatment of pancreatic cancer follows the principle of supporting the righteousness by benefiting the qi, and at the same time the method of removing the evil by clearing heat and detoxifying the toxin, invigorating blood stasis, and promoting water retention to reduce swelling.

Based on the association rule-based formula analysis, a total of 18 drug combinations were mined, involving 8 flavors of high-frequency drugs, namely Fu Ling, Atractylodes macrocephala, Radix Codonopsis pilosulae, Radix et Rhizoma pilosulae, Radix et Rhizoma cinnabarum, Radix et Rhizoma cinnabarum, Radix et Rhizoma astragali, Radix et Rhizoma alba, which can be characterized as the core drug combinations for the treatment of pancreatic cancer, and the analysis results showed that Radix et Rhizoma pilosulae → Fu Ling with a confidence level of about 96.15%.Party ginseng, Poria → Atractylodes macrocephala, confidence level of about 90.91%; Party ginseng, Atractylodes macrocephala → Poria, confidence level of about 90.91%, the higher the confidence level indicates that the probability of before and after combination is greater. Modern pharmacological studies have shown that Poria [14], Radix Codonopsis [15], Atractylodes [16], and Atractylodes [17] have anti-tumor, anti-inflammatory, and immune enhancing effects. The association mesh shows that the most closely associated are heat-clearing drugs, blood-stasis activating drugs, tonic drugs, and water-releasing and damp-permeating drugs. In terms of the drug association rules, warm, pungent, bitter and cold as well as liver and spleen meridians were the main core combinations, and the results showed that warm and pungent → spleen with a confidence level of about 90.91%, pungent and sweet → bitter with a confidence level of about 84.62%, and warm → spleen with a confidence level of about 84.21%. From the perspective of drug attribution to meridians, the reticulation showed the strongest connection between liver, spleen and stomach meridians. All these are basically consistent with the results of frequency analysis. Li Zhongzi, a Ming dynasty physician, said, "Therefore, to remove the accumulation and half, purely with sweet and warm tonics, so that the spleen is healthy and healthy, the residual accumulation of the broken residue, not attacked since the go, must want to attack no residue, which does not leave people premature death is rarely carried out." Therefore, in the treatment of pancreatic cancer, we should use more warm and gentle products, while taking into account the spleen and stomach to transport and transform.

Data mining is an important approach in the development of modernization of Chinese medicine. In this study, the frequency correlation analysis was used to explore the pattern of prescriptions used in the treatment of pancreatic cancer. However, due to the relatively limited sample size, it could not fully reflect the thinking of medical practitioners and the pattern of superficial prescriptions, but it was concluded that the treatment should take into account the balance of supporting the positive and eliminating the evil, and treating both the symptoms and the root cause, and highlighted the pattern of formulas with Atractylodes macrocephala, Fu Ling, Radix Codonopsis pilosulae and Rhizoma alba as the core drugs. It also highlighted the grouping rules of Atractylodes macrocephala, Fu Ling, Radix Codonopsis pilosulae, and Radix et Rhizoma alba as the core drugs.

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