Research on Medication Rules of Chronic Gastritis and Allergic Rhinitis Based on the Complex System Entropy Clustering Method

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1. Introduction

1.1 Mining principle of herbal combinations

The highlight of this research is providing a appropriate statistical method to find out medication rules of chronic gastritis and allergic rhinitis, which will help us to guarantee clinical effects for this two diseases.

Five Viscera Tonifying Method (FVTM) was established by Prof. Gao Zhongying, a national prestigious and experienced practitioner of Traditional Chinese Medicine (TCM). This method extends the implication of tonfiying method while making a break-through in traditional TCM theory. With this featured method in pattern identification and herbal prescription, Prof. Gao is famed for his significant clinical effects by using well-prescribed formula. Modified Lung Tonifying Decoction (LTD), a representative formula of five viscera tonifying method, is indicated and effective for various lung diseases. We employed complex system entropy cluster technique to mine the data of prescriptions by this prestigious and experienced TCM practitioner. It is clinically significant to explore prescription rules of herbal medicine in the treatment of lung diseases to guarantee clinical effects.

According to statistics from World Health Organization (WHO), lung diseases have been one of the four leading diseases that pose great threatens to human health. Conventional treatment using western drugs proves to be advantageous yet its side-effects are hindering patient compliances and thus the clinical effects. There are over 1000 formula indicated for lung diseases, which have been developed in the 2000-year history of Traditional Chinese Medicine (TCM). Modern prestigious and experience TCM practitioners also have developed numerous their own effective formula based on inheriting the essence of prescription rules by ancient practitioners. To study the rules of these formulas is of great significance to facilitate the prescription rules of effective herbal treatment and to explore new formula for lung diseases.

There have been very few studies on prescription rules of herbal medicine for lung diseases by prestigious and experienced TCM practitioners. This study employed complex system entropy cluster technique to mine the data of prescriptions of the prestigious and experienced TCM practitioner and to explore prescription rules of herbal medicine in the treatment of lung diseases to guarantee clinical effects.

1.2 Data mining methods based symptoms clustering

The syndrome is the basic pathological unit and the key concept in traditional Chinese medicine (TCM), and the herbal remedy is prescribed according to the syndrome a patient catches. Nevertheless, few studies are dedicated to investigate the number of syndromes in chronic heart failure (CHF) patients and what these syndromes are. In this paper, we carry out a clinical epidemiology survey and obtain 317 CHF cases, including 62 symptoms in each report. Based on association delineated by mutual information, we employed a pattern discovery algorithm to discover syndromes, which probably have overlapped symptoms in TCM. A revised version of mutual information is presented here to discriminate positive and negative association. The algorithm self-organizedly discovers 15 effective patterns, each of which is verified manually by TCM physicians to recognize the syndrome it belongs to. Therefore, we conclude that the algorithm provides an excellent solution to chronic heart failure problem in the context of traditional Chinese medicine.

Heart failure (CHF) is the most terminal stages of cardiovascular disease to the clinical development of overall performance, with the improvement of living standards and the popularity of interventional cardiology techniques, the proportion of heart failure was increased gradually become a cause of coronary heart disease The main basis for heart failure (Lu&Zhong,2010). Activities by the degree of heart failure symptoms of impaired heart function status was assessed clinically NYHA classification is more commonly used by the patients cardiac function contribute to determine the extent of the disease Qing Qian and treatment options. At present, this area on TCM Syndrome research is still small. In this study, clinical epidemiology, collected coronary heart disease signs and symptoms of heart failure patients, through the heap of entropy together to compare the cardiac function in different situations and syndromes four diagnostic elements of the evolution of features, designed to further grasp the law of the disease syndromes, diagnosis and treatment for the disease to provide a basis for Chinese medicine.

Data mining is a systematic approach used not only to identify biomarkers for a disease but also to investigate the cellular interaction in the context of a disease to construct biological networks.

Data mining also has a crucial role to play in TCM-related research activities. By text mining, a branch of data mining approaches, the biological networks underlying cold and hot syndromes phenotypes are constructed by NEI specifications (Li et al.,2007).Similarly, through a combination of Chinese literatures on TCM and related English counterparts on most diseases on PubMed database, biological networks for a syndrome in TCM in the context of a disease can be automatically generated through text mining approaches (Zhou et al.,2007).In addition, several novel data mining approaches were presented to deal with various kinds of clinical or in vivo animal data. An unsupervised cluster algorithm called pattern discovery algorithm was developed to discover syndromes in TCM in the context of a disease,which provides the targets for formulae or prescriptions since they are prescribed based on syndromes diagnosed (Chen et al.,2007). Furthermore, animal models for syndrome in TCM in the context of diseases were built by using supervised data mining approach to'clone' diagnosis criterion from clinics to animals, which paves a way for in vivo experimental validation of a prescription.8 However, when applying data mining approach in TCM, few research efforts are made in research activities of TCM, it is important to investigate the role of data mining approaches in them.

In information theory, mutual information (MI) of two random variables is a measure that scales mutual dependence of the two variables. It has been applied in many fields, in which researchers treat as divergence or distance between two distributions.

2. Materials and methods

2.1 Mining principle of herbal combinations
2.1.1 Formula source

All the formula comes from clinical prescriptions by Prof. Gao Zhongying. Prof. Gao Zhongying is a national prestigious and experienced TCM practitioner. He was born in a TCM family of generations and has been working in the fields of TCM clinics, teaching and research for 55 years. He has worked as the director of TCM internal medicine department and herbs & formula department. He has studied TCM theories and applied them in clinic with care before establishing Five Viscera Tonifying Method (FVTM). This method is a breakthrough in traditional TCM theory. It extends the implication of tonifying method and represents featured pattern identification and herbal administration. His formulas are well-prescribed with significant clinical effects. LTD has proven to be effective as a representative of FVTM. To mine the data of formula by Prof. Gao is mainly to collect and categorize LTD prescriptions in this study.

2.1.2 Establishment of formula database

To meet the requirements of data mining and analysis, processing and categorizing the data is a perquisite. Standardized terms were used as 'Final Term' to code the symptoms, signs, tests in the case records. Independent 'Pattern Elements' were summarized or extracted from the cases after standardizing the diagnosis, patterns and treatment according to international and textbook criteria. Phrase databases of patterns and treatments were thus finally established. A database of the medicinal used in the formulas was categorized by their classes, functions, prosperities and meridian entry. The names of medicinals are consistent with those used in the current 21 century textbook.

A module of structured case records based on Access platform was established to collect the clinical data of Prof. Gao Zhongying. All the information about the patients were included using a national standard case record format and access database platform. Clinical data of the 389 cases were carefully recorded in details based on Systemic and Structured Data Entry Criteria in Collecting Clinical Information of Prestigious and Experienced TCM Practitioners. The structured clinical information and other data was included into the system and a Prof. Gao's clinical database was thus formed.

2.1.3 Data analysis method

Before introducing the algorithm, we give a rigorous definition to mutual information
The definition of mutual information
Suppose system $X = (X_1, X_2, \cdots, X_a, \cdots, X_p)^T$ is consisted of p variables, $p \in N$ (N set of natural number), where $X_a = (X_{a_i})$, $a = 1, 2, \cdots, p$; $i = 1, 2, \cdots, q$. Here our objective is to obtain some subsets which have some close properties from set X. Let $C_a(a = 1, \cdots, p)$ be set of classification of X_a, $C_{a_i} = i$ be i-th element of C_a, then we have $C_a = \{1, 2, \cdots, i \cdots, k\}$, $k \le q$, and let n_i be quantity for X_a belong to i-th class, then entropy of X_a is defined as

$$H(X_a) = -\sum_{i=1}^{k} n_i / q \log n_i / q \tag{1}$$

The joint entropy of X_a, X_b is similarly defined as

$$H(X_a \bigcup X_b) = -\sum_i \sum_j n_{ij} / q \log n_{ij} / q \tag{2}$$

where n_{ij} is quantity for X_a belong to i-th class of C_a simultaneously X_b belong to j-th class of C_b. For the convenience of application, expressions (1) and (2) can respectively be represented as

$$H(X_a) = \log q - \frac{1}{q} \sum_{i=1}^{k} n_i \log n_i \tag{3}$$

$$H(X_a \bigcup X_b) = \log q - \frac{1}{q} \sum_i \sum_j n_{ij} \log n_{ij} \tag{4}$$

Having had above-mentioned definition of entropy, in what follows, correlative measure by which statistical dependence between X_a and X_b is denoted is defined by their mutual information.

Definition 1. Correlative measure between two variables

For arbitrary $X_a \in X$, $X_b \in X$, suppose $X_a \bigcap X_b = \phi$, then entropy

$$H(X_a, X_b) = H(X_a) + H(X_b) - H(X_a \bigcup X_b) \tag{5}$$

is called correlative measure $\mu(X_a, X_b)$ between X_a and X_b.

Definition 2. Correlative measure among multi-variables

Suppose $X_a \bigcap X_b = \phi$ for arbitrary $a, b (a \neq b)$, $p \in N$ then

$$\mu(X_1, X_2, \cdots, X_p) \overset{\Delta}{=} \sum_{a=1}^{p} H(X_a) - H\left(\sum_{a=1}^{p} X_a\right) \tag{6}$$

is called correlative measure among X_1, X_2,...and X_p.

We can also extend the definitions of correlative measure among variables to that of subsets of complex system. In fact, the variable itself is also one particular subset.

Definition 3. Correlative measure among multi-subsystems

Suppose system X be partitioned into m subsystems $s_1, s_2, \cdots, s_m$, for arbitrary i, j $(i \neq j)$, $s_i \bigcap s_j = \phi$, $X = \sum_{i=1}^{m} s_i$, then

$$\mu(s_1, s_2, \cdots, s_m) \overset{\Delta}{=} \sum_{i=1}^{m} H(s_i) - H\left(\sum_{i=1}^{m} s_i\right) \tag{7}$$

is called correlative measure among $s_1, s_2, \cdots, s_m$.

Let us consider nonempty finite set X and set-family $E(X)$ consisted of its subsets, P is a set-function defined on $E(X)$ with properties:

i. $P(A) \geq 0$, $\forall A \in E(X)$,

ii. $P(\varnothing) = 0$

The complex entropy cluster algorithm

The algorithm is detailedly presented in (Chen et al.,2007), we also present it here.

Once association for each pair (every two variables) is acquired, we propose a self-organized algorithm to automatically discovery the patterns. The algorithm can not only cluster, but also realize some variables appear in some different patterns. In this section, we use three subsections to introduce the algorithm. The first introduce the concept of "Relative" set. Based on this, the pattern discovery algorithm is proposed in second subsection. The last subsection is devoted to presenting an n-class association concept to back up the idea of the algorithm.

For a specific variable X, a set, which is collected by mean of gathering N variables whose associations with X are larger than others with regard to X, is attached to it and is denoted as $R(X)$. Each variable in the set can be regarded as a "Relative" of X while other variables that not belong to the set are considered as irrelative to X, so we name $R(X)$ "Relative" set of X. The "Relative" sets of all 20 variables can be denoted by a $20 \times N$ matrix. Based on the matrix, the pattern discovery algorithm is proposed.

A pair (variable X and Y) is defined to be significantly associated if and only if X belongs to the "Relative" set of Y ($X \in R(Y)$) and vice versa ($Y \in R(X)$). It is convenient to extend this definition to a set with multiple variables. If and only if each pair of these variables is significantly associated, then we can call that the set is significant associated. A pattern is defined as a significantly associated set with maximal number of variables. All these kinds of sets constitute the hidden patterns in the data. Therefore, a pattern should follow three main criteria: (1) the number of variables within a set is no less than 2. (2) Each pair of the variables belong to a set is significantly associated. (3) Any variable outside a set can not make the set significantly associated. This means the number of variables within the set reaches maximum.

We defined that two variables X and Y are correlated if and only if they are inter-relative, i.e., X is a 'relative' of Y and vice versa. It is convenient to extend this definition to the case with multi-variables, if each pair between these variables is correlated, then we called that they are correlated. A set that is comprised of maximal variables in which each pair is correlated is defined as a pattern and all sets constitute the hidden patterns in the data acquired above.

2.2 Data mining methods based symptoms clustering
2.2.1 Clinical epidemiology
317 patients with coronary heart disease patients with heart failure were collected from May 2009 to March 2010 Dongzhimen Hospital, Beijing University of Chinese Medicine, Dongfang Hospital, Beijing University of Chinese Medicine, Department of Cardiology of the patients.

2.2.2 Diagnosis criteria
(1) coronary artery disease with reference to the International Society of Cardiology and the Society, named after the World Health Organization standardized clinical report of the Joint Task Team, "named after ischemic heart disease and diagnostic criteria"; (2) diagnosis of heart failure based on diagnosis of chronic heart failure in China in 2007 treatment guidelines; cardiac function with reference to the New York Heart Association (NYHA) 1928 annual standard.

2.2.3 Inclusion criteria
Coronary heart disease and chronic heart failure meet the above diagnostic criteria, older than 18 years of age and less than or equal to 80 years of age and informed consent, patients participated in this study.

2.2.4 Exclusion criteria

Exclusion criteria isBy the expansion of heart disease, pulmonary heart disease, rheumatic heart disease, cardiomyopathy, congenital heart disease and other heart disease due to heart failure patients; with acute myocardial infarction, cardiogenic shock, severe arrhythmias associated with hemodynamic changes in persons; concurrent infection : ① fever; ② blood increased, white blood cell count> 10 × 109 / L, neutrophils> 85%; ③ chest X-ray shadows suggestive of sheet; with severe hepatic insufficiency (liver function values> normal 2 times), renal insufficiency (Ccr> 20%, Scr> 3mg/dl or> 265μmol / L), blood system, the primary disease, malignant tumor; pregnancy or breast-feeding women; mental illness, infectious diseases

2.2.5 Survey methods

Survey methods of clinical epidemiology, screening results in the literature and two rounds of preliminary questionnaire was developed based on expert clinical four diagnostic information collection form, in patients with heart failure collect demographic data, present illness, symptoms and signs, and tongue, veins and other information.

2.2.6 Quality control

Clinical Hospital, prior to the survey of the designated person responsible for, the research group to develop the work of the researchers involved in the study manual for the doctor and unified training. Establish Epidate3.1 database, all cases investigated by double data entry.

3. Conclusion

3.1 Mining principle of herbal combinations

By using the following data analysis methods, the corresponding results are given in Table 1 to Table 3 as well as Figure 1.
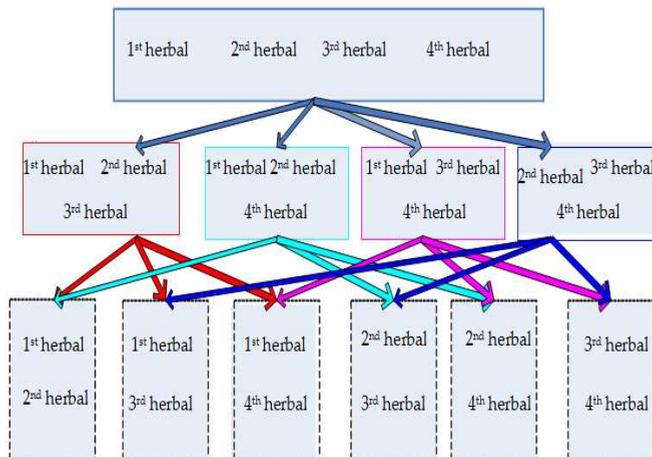

Fig. 1. The illustration of cluster process. Where 1st, 2nd ,3rd and 4th herbal represents milk-vetch root, rehmannia, heterophylly false satarwort root and Chinese magnolivine fruit respectively.

Herbal	Frequency	Usage	Herbal	Frequency	Usage
heterophylly false satarwort root	284	0.73008	scutellaria root	54	0.13882
milk-vetch root	270	0.69409	dwarf lilyturf tuber	52	0.13368
prepared rehmannia root	269	0.69152	common coltsfoot flower	46	0.11825
Chinese magnolivine fruit	265	0.68123	psoralea fruit	45	0.11568
tatarian aster root	222	0.57069	ephedra herb	43	0.11054
white mulberry root-bark	178	0.45758	Stir-baking bupleurum with vinegar	41	0.1054
pepperweed seed	136	0.34961	dried ginger rhizome	39	0.10026
snakegourd fruit; trichosanthes fruit	131	0.33676	Cassia twig	34	0.087404
pinellia rhizome	91	0.23393	great burdock achene	33	0.084833
platycodon root	91	0.23393	liquorice root	32	0.082262
rehmannia root	76	0.19537	heartleaf houttuynia herb	32	0.082262
tendrilled fritillaria bulb	64	0.16452	Chinese waxgourd seed	31	0.079692
stemona root	56	0.14396	smoked plum	31	0.079692
blackberry lily rhizome	55	0.14139	magnolia bark	30	0.077121
almond	55	0.14139			

Table 1. Commonly-used medicinal in the prescriptions of modified LTD for lung diseases

Herbal combination		Mutual information	Herbal combination		Mutual information
cockleburr fruit	blond magnolia flower	0.20823	euryale seed	pepperweed seed	0.07403
psoralea fruit	euryale seed	0.1568	perilla-seed	tatarian aster root	0.071148
blackberry lily rhizome	pepperweed seed	0.14528	snakegourd fruit	immature orange fruit	0.070149
ephedra herb	almond	0.1384	Stir-baking bupleurum with vinegar	blond magnolia flower	0.067455
platycodon root	pepperweed seed	0.13568	white atractylodes rhizome	ledebouriella root	0.064919
Indian bread	cassia twig	0.12965	common coltsfoot flower	pepperweed seed	0.063739
pinellia rhizome	red tangerine peel	0.1181	amur cork-tree bark	light yellow sophora root	0.06262
psoralea fruit	pepperweed seed	0.11559	stemona root	tatarian aster root	0.062125
prepared rehmannia root	Chinese magnolivine fruit	0.10894	Safflower	turmeric root tuber	0.061022
platycodon root	oroxylum seed	0.10519	atractylodes rhizome	light yellow sophora root	0.059596
platycodon root	great burdock achene	0.10188	tree peony bark	light yellow sophora root	0.059596
ephedra herb	great burdock achene	0.096925	donkey-hide gelatin pellets	dwarf lilyturf tuber	0.059468
bile arisaema	glabrous greenbrier rhizome	0.095717	pepperweed seed	tatarian aster root	0.05726
magnolia bark	almond	0.094751	light yellow sophora root	glabrous greenbrier rhizome	0.055996
platycodon root	white mulberry root-bark	0.088538	cassia twig	Safflower	0.055512
psoralea fruit	white mulberry root-bark	0.08771	kudzuvine root	Euonymi twig	0.055454

Herbal combination		Mutual information	Herbal combination		Mutual information
oldenlandia	bearded scutellaria	0.083543	snakegourd fruit	milk-vetch root	0.053697
suberect spatholobus stem	centipede	0.083543	common coltsfoot flower	blackberry lily rhizome	0.052638
rehmannia root	scutellaria root	0.083134	heterophylly false satarwort root	Chinese magnolivine fruit	0.052357
perilla-seed	pepperweed seed	0.082173	donkey-hide gelatin pellets	turmeric root tuber	0.052208
snakegourd fruit	scutellaria root	0.08126	great burdock achene	pepperweed seed	0.052098
cockleburr fruit	Stir-baking bupleurum with vinegar	0.079804	Indian bread	Euonymi twig	0.050529
curcumae rhizome	cassia twig	0.077009	cockleburr fruit	ledebouriella root	0.050329
cnidium fruit	glabrous greenbrier rhizome	0.076576			

Table 2. Commonly-used medicinal combinations and combining values in the prescriptions of modified LTD for lung diseases

pinellia rhizome	tendrilled fritillaria bulb	common coltsfoot flower	blackberry lily rhizome
cockleburr fruit	Stir-baking bupleurum with vinegar	Chinese magnolivine fruit	blond magnolia flower
common coltsfoot flower	blackberry lily rhizome	perilla-seed	pepperweed seed
blackberry lily rhizome	perilla-seed	pepperweed seed	tatarian aster root
donkey-hide gelatin pellets	white peony root	atractylodes rhizome	
donkey-hide gelatin pellets	atractylodes rhizome	light yellow sophora root	

pinellia rhizome	tendrilled fritillaria bulb	common coltsfoot flower	blackberry lily rhizome
donkey-hide gelatin pellets	atractylodes rhizome	dwarf lilyturf tuber	
donkey-hide gelatin pellets	liquorice root	turmeric root tuber	
donkey-hide gelatin pellets	Safflower	turmeric root tuber	
donkey-hide gelatin pellets	dwarf lilyturf tuber	turmeric root tuber	
white peony root; peony	suberect spatholobus stem	centipede	
white atractylodes rhizome	aged tangerine peel	liquorice root	
white atractylodes rhizome	prepared rehmannia root	Chinese magnolivine fruit	
stemona root	platycodon root	oroxylum seed	
stemona root	cassia bark	oroxylum seed	
pinellia rhizome	common coltsfoot flower	white mulberry root-bark	
thunberg fritillary bulb	liquorice root	hogfennel root	
thunberg fritillary bulb	great burdock achene	hogfennel root	
psoralea fruit	common coltsfoot flower	white mulberry root-bark	
psoralea fruit	common coltsfoot flower	pepperweed seed	
psoralea fruit	euryale seed	pepperweed seed	
cockleburr fruit	ephedra herb	blond magnolia flower	

Table 3. Core medicinal combinations in the prescriptions of modified LTD for lung diseases

The name of Lung Tonifying Decocction (LTD) has been found in several ancient literatures. The ingredients recorded in Yun QI Zi Bao Ming Ji (Yun Qi Zi's Collections of Life-saving Formula) are different from those in Bei Ji Qian Jin Yao Fang (Essential Prescriptions Worth a Thousand Gold for Emergiences) and San Yin Ji Yi Bing Zheng Fang Lun (Treatise on Three Categories of Pathogenic Factors and Prescriptions). Prof. Gao used the ingredients of former source. Some Scholars says this formula was originated from Yong Lei Qian Fang written by Li Zhongnan in 1331 and Jing Yue Quan Shu (Complete Works of Jingyue). Sang Bai Pi (Cortex Mori), Di Huang (Radix Rehmanniae), Ren Shen (Radix et Rhizoma Ginseng),

Zi Wan (Radix et Rhizoma Asteris), Huang Qi (Radix Astragali), Wu Wei Zi (Fructus Schisandrae Chinensis) formulates a representative formula for tonifying lung qi. It was originally indicated for Lao Sou (consumptive cough) due to five viscera deficiency pattern manifested as afternoon tidal fever, spontaneous sweating or nigh sweating, cough with sputum, dyspnea with panting. In the formula, Ren Shen and Huang Qi are sweet and warm in nature. They are used to tonify qi, supplement the defense aspect and secure the exterior. The two medicinals are targeted at deficiency of spleen and lung. Di Huang is to supplement kidney essence to supply qi, tonify the lower to supplement the upper part of the body. It is also used to supply water to moisten the lungs and remove the deficiency dryness in the upper source. Wu Wei Zi and Zi Wan can astringe the lungs and moisten the dryness to relieve dryness and coughing. Sang Bai Pi clears the heat and calms down the reverse qi to resolve phlegm and stop coughing. These medicinals used together are to tonify the spleen and kidneys, moisten the dryness and stop coughing. That's how it works in most cases in the clinic.

In terms of the number of medicinal, Prof.Gao tends to use a few medicinals with specific targets. On average there are around 12 medicinals in each of his formula. Table 1 shows that Prof. Gao sticks to the original ingredients of the formula. The commonly-used medicinals ranked in the first 6 places are originally used in the formula. Modification is often used for specific symptoms. For example Ban Xia (Rhizoma Pinelliae) and Gua Lou (Fructus Trichosanthis) are combined to strengthen the effects of phlegm resolving. Table 2 shows that Prof. Gao tends to use Xin Yi (Flos Magnoliae) combined with Cang Er (Fructus Xanthii) to open the nasal orifice, Wu Wei Zi (Fructus Schisandrae Chinensis) combined with vinegar processed Chai Hu (Radix Bupleuri) to antagonize allergy. The results indicate that it is significant to mine data of prescriptions by prestigious and experienced TCM practitioners by using complex system entropy cluster technique.

Modified LTD is effective for various lung diseases, yet it has not been included by the current formula textbook. There has been few literature and clinical studies on this formula as well. According to incomplete statistics, Prof. Gao has used the modified LTD to treat Chronic Obstructive Pulmonary Diseases (COPD), Idiopathic Pulmonary Fibrosis (IPF), anthrasilicosis, bronchiectasis, allergic asthma and rhinitis besides coughing and panting in the clinic. Most attention should be drawn to this formula by the clinicians to improve clinical effects.

3.2 Data mining methods based symptoms clustering

Information collection form will be provided by the signs and symptoms of each patient were statistically and found 317 cases of heart failure in patients with systemic symptoms Shenpi fatigue (100%), shortness of breath (93%), less gas lazy words (71 %), spontaneous (39%), chills (39%), five upset hot (27%) majority; head, face the common symptoms of dizziness (73%), lips cyanosis (58%), dark complexion (22%); mind and flank the chest symptoms (88%), palpitations (76%), wheezing (57%), chest pain (37%), expectoration (30%) were more; stomach and abdominal symptoms of bloating (48 %) was the most common; waist and limbs Yaoxisuanruan common symptoms (73%), limb trapped weight (51%), and edema (55%), hand, foot and not warm (39%); restaurants and taste of symptoms to loss of appetite (59%), dry mouth (48%), sticky mouth (27%) were more symptoms of sleep and the two will be to insomnia (65%), nocturia (38%) most common; tongue in order to sublingual vein abnormalities (61%), tongue dark (55%), crack the tongue (34%), tongue pink (24%),

less or no moss moss (20%), fat large indentation tongue (19%) is more common; pulse late in the common pulse (49%), pulse astringent (21%), promoting Pulse (17%), pulse knot generation (10%).

By using pattern discovery algorithm, the 15 patterns were given in Table 4.

No.	Combination of symptoms	Syndrome diagnosed
1	Shortness of breath, asthma, fatigue, side limb edema	Qi Deficiency
2	Abdominal distention, gurgling, nausea, vomiting, mouth light thirsty	
3	Abdominal threatening pain, backache, headache, nausea expansion Xiong Xie	Qi stagnation
4	Subject to colds, cough, Long cough, sputum	
5	Shortness of breath, Shenpi, fatigue	Qi Deficiency
6	Shortness of breath, wheezing, sputum	
7	Shenpi, cough, bad air	
8	Fatigue, loss of appetite, shortness of breath	
9	Top-heavy, such as wrap, dizziness, limb paralysis Ma	
10	Ringing in the ears, knees soft, backache	
11	Tinnitus, backache, nausea expansion Xiong Xie	
12	Five upset hot, dry mouth, hot flushes and night sweats	Yin Deficiency
13	Five upset hot, constipation, hot flushes and night sweats	
14	Headache, nausea expansion Xiong Xie, channeling pain away	
15	Cough, Cough, the evil wind	

Table 4. 15 patterns for CHF

In heart failure have been recorded, including early, carved in Chinese medicine is a "heart palpitations", "Tan Yin" and "asthma card", "edema", "accumulation" and other areas. On the characteristics of the basic pathogenesis of heart failure, there are different points of view, Wong (Li et al.,2007) that the disease is mainly responsible for deficiency in the heart failure, falling seedlings lung, spleen, kidney all dirty and wet phlegm from each breeding Results from the heart Qi-oriented, blood stasis, water to drink as standard; Wang (Wang,2005) that the deficiency and yang-oriented virtual, blood stasis, water resistance, phlegm as the standard implementation of the levy; Chen (Li&Chen,2006) will be virtual, stasis, water summarized as the basic pathogenesis of the disease. 200 patients from four diagnostic methods of frequency analysis results, the heart failure patients often show the signs and False or True, false to qi deficiency, yang deficiency, yin deficiency is a common, real to stasis, water, sputum-based, I believe that deficiency may be associated with their hypertension, diabetes and other primary diseases related to each other based on the root theory of yin and yang, yang deficiency and yin, yang to a certain extent patients can occur when the signs of deficiency, it also Coronary Heart Yin decline in the basic pathogenesis of the important part.

Entropy algorithm for the clustering together of the heap in one, with the traditional method compared to non-supervised clustering, which is characterized by improved correlation between two variables method, effectively avoid the interference of negative data, through the calculate the two bivariate correlation coefficients between each variable designated the "friends group", after convergence, go to "friends group" within the limited number of variables, leaving the variables must be close to each other with higher levels of combination, this data extraction process and we are in the clinical symptoms and signs by a certain type of information gathering to designate property Panduan a similar card, therefore, become the method to explore between the clinical symptoms and Syndrome internal laws of the more common and objective mathematical method. In this study, patients with different cardiac function four diagnostic variables together elements of the heap after the analysis of the syndrome of basic and clinical match, but the law also has some defects, such as better together to make the variable into a class, we screened the raw data, which may lose some useful information. In conclusion, this study together after the data, while the heap is not fully reflect the clinical, but at least clinical symptoms of the disease trends in the evolution provide some reference.

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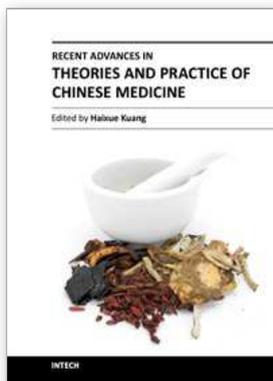
Recent Advances in Theories and Practice of Chinese Medicine

Edited by Prof. Haixue Kuang

During the recent years, traditional Chinese medicine (TCM) has attracted the attention of researchers all over the world. It is looked upon not only as a bright pearl, but also a treasure house of ancient Chinese culture. Nowadays, TCM has become a subject area with high potential and the possibility for original innovation. This book titled Recent Advances in Theories and Practice of Chinese Medicine provides an authoritative and cutting-edge insight into TCM research, including its basic theories, diagnostic approach, current clinical applications, latest advances, and more. It discusses many often neglected important issues, such as the theory of TCM property, and how to carry out TCM research in the direction of TCM property theory using modern scientific technology. The authors of this book comprise an international group of recognized researchers who possess abundant clinical knowledge and research background due to their years of practicing TCM. Hopefully, this book will help our readers gain a deeper understanding of the unique characteristics of Chinese medicine.

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