

# Study on the evolution of TCM Syndrome of Diabetic nephropathy

## Abstract

Through the epidemiological investigation of diabetic nephropathy and type 2 diabetic patients and the analysis of their TCM syndromes, we described the evolution of TCM syndrome of diabetic nephropathy.

**Methods:** The “TCM syndrome scale of diabetic nephropathy” was conducted a cross-sectional study on diabetic nephropathy and type 2 diabetic patients. 237 cases data of diabetic nephropathy and 400 cases data of diabetic were collected, with their general and Chinese medical information. We used cluster analysis to sum up the evolution of TCM syndrome of diabetic nephropathy.

**Results:** According to the distribution of TCM syndrome, the mainly TCM syndrome of diabetic was inner heat and yin deficiency, but diabetic nephropathy still had yang deficiency and blood stasis. Based on cluster analysis, diabetic nephropathy covered the major diabetic syndrome with yang deficiency obviously. It developed into yin and yang deficiency, but blood stasis was throughout the course always.

**Conclusion:** Analysing the evolution of TCM syndrome of diabetic and diabetic nephropathy, they were all deficiency in root and excess in branch. Qi and yin deficiency with inner heat was the basic characteristics of diabetic, and yang deficiency was obvious based on diabetic. It developed into yin and yang deficiency gradually, but blood stasis was throughout the course always. In different stages of the same disease were used in clustering analysis of TCM syndromes research, the train of thought and method has a certain practical significance to explore the syndrome evolution.

**Keywords:** type 2 diabetes, diabetic kidney disease, clustering analysis, information of four diagnoses, syndrome of tcm

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**Abbreviations:** DKD, diabetic kidney disease; ESRD, end-stage renal, disease; TCM, traditional Chinese medicine

## Introduction

With the aging of the population, economic development and the change of people's lifestyle, type 2 diabetes mellitus (T2DM) has become a common disease in the world, is a kind of serious harm to people's health of chronic non communicable diseases. Diabetic kidney disease (DKD) is one of the most important diabetic microvascular complications, is also one of the main causes of chronic renal failure. In China common in adults, and about 94200000 had diabetes, diabetes has become epidemic trend<sup>1</sup> and so no matter in developed countries or in developing countries, diabetes is the leading cause of end-stage renal disease (end-stage renal, disease, ESRD) is the main reason. Diabetic nephropathy has become a major public health problem in many countries face, further to the prevention and treatment work.

Therapy of traditional Chinese medicine in prevention and treatment of type 2 diabetes mellitus and diabetic nephropathy has unique advantages, however, because the physical and medical patients from north to south, the understanding of the pathogenesis of different traditional Chinese medicine on diabetic nephropathy, syndrome differentiation and there is no unified standard, is not conducive to the Chinese Medicine clinical research collaboration. So we adopt a different stage of type 2 diabetes mellitus and diabetic nephropathy of the same disease were used in clustering analysis of TCM syndromes research, to discuss the evolution of syndrome disease, has a certain practical significance to further reveal the pathogenesis of the disease.

## Methods

### Sample selection

This study selected all the cases from Hangzhou City Red Cross Hospital from 2012 October to 2013 October in outpatients and inpatients, selected the diagnosis of type 2 diabetes mellitus and diabetic nephropathy in patients with III ~ IV, age and gender not limited. The selected patients were stratified results based on laboratory investigation, choose to clinical diagnosis in patients with type 2 diabetes and 400 cases of diabetic nephropathy patients with 237 cases, III stage IV.

### Diagnosis and staging criteria

The selected all patients with diabetes diagnostic criteria proposed by WHO in 1999 and 2003 Chinese Diabetes Society written “China diabetes prevention guide” for the proposed diagnostic criteria of type 2 diabetes mellitus.<sup>2</sup> staging diagnosis of diabetic nephropathy stage according to the internationally recognized scholar Mogensen<sup>3</sup> of Denmark.

### Inclusion criteria

Diabetic nephropathy patients accorded with the diagnostic standard of III ~ IV, excluding hypertension, heart failure, urinary tract infection, ketoacidosis and other factors causing urinary albumin increased; other infection, acidosis, electrolyte disorder, hypertension has been effectively controlled.

### Exclusion standard of cases

Renovascular hypertension; six months with malignant hypertension, myocardial infarction, cerebrovascular accident, diabetic ketoacidosis and other critical disease; heart, brain, liver and hematopoietic system and the severe primary disease; psychiatric patients; cancer, pregnancy, lactation patients.

### Method of investigation

Methods to collect the data for cross section, the TCM syndromes in diabetes nephropathy “scale” (hereinafter referred to as “Tangshen scale”).<sup>4,5</sup> to investigate the situation of demographic characteristics and TCM Syndromes of 400 cases of 237 cases of diabetic nephropathy in patients with type 2 diabetes and simple by using cluster analysis of traditional Chinese medicine; patients with nephrotic syndrome of diabetes syndrome evolution. According to the general requirements of the multi factor analysis, multivariate analysis of variables in this study included (“Tangshen scale” entries) up to 42, the actual observation in patients with diabetic nephropathy in 237 cases of patients with type 2 diabetes, 400 cases with observation, sample size requirements. In the respondents informed and consent based on the implementation of the investigation. According to the “Tangshen scale” projects to set up the database system for the test by using ACCESS software. Two dual independent data entry the data administrator.

### Statistical analysis

The use of statistical software SPSS13.0 statistical analysis software package. Descriptive statistical analysis, quantitative data with normal distribution, the mean, standard deviation; does not meet the normal distribution, the maximum value, minimum, median, four spacing; qualitative data in percentage, the constituent ratio of expression. Study on Zhengzhou distribution by using SAS9.2 statistical software for cluster analysis. Data were compared using t test for comparison between two groups, with P less than or equal to 0.05 as the significant statistical significance, P is less than or equal to 0.01 as a highly significant difference.

## Results

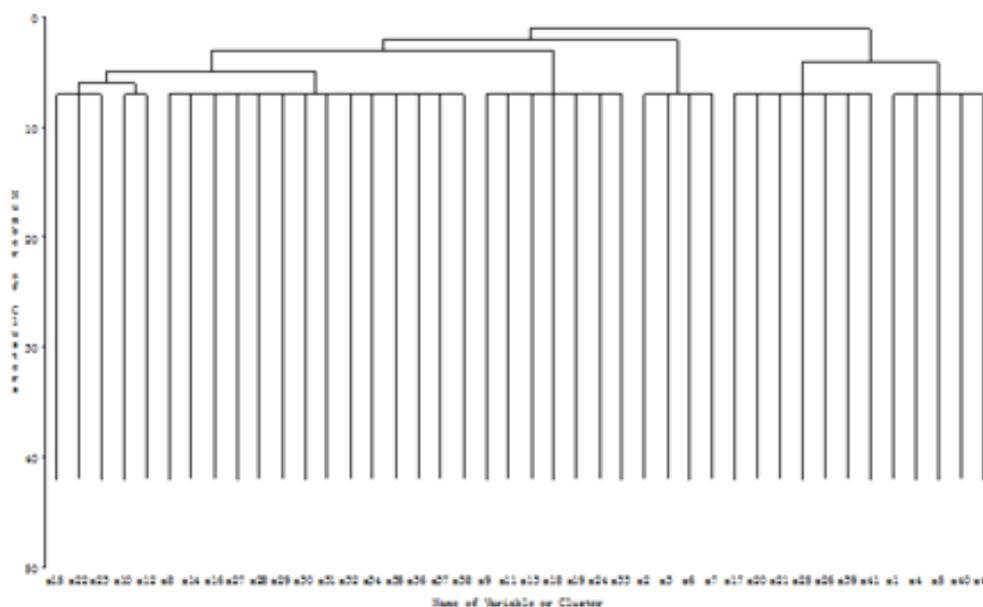
### Baseline material distribution

Investigation of 400 cases of type 2 diabetes patients, male 214 female 186 people accounted for 53.5%, accounted for 46.5%; the maximum age of 90 years old, the youngest 24 years old, average 60.89 years old; the normal distribution test for the non normal distribution, the median age was 62 years old, the four percentile interval for 7351 = 22; median male age is 60 years old, the four percentile interval for 7049 = 21 women; median age was 62 years, the four percentile interval for 7555 = 20. Patients male to female ratio was 1: 0.87. 237 cases of diabetic nephropathy patients were investigated, 129 were male 54.4%, female 108 patients, accounted for 45.6%; the maximum age of 91 years old, the youngest 26 years old, average 63.93 years old; the normal distribution test for the non normal distribution, the median age was 64 years old, the four percentile interval for 7655 = 21; male the median age was 62 years old, the four percentile interval for 7554 = 21 women; median age was 66 years, the four percentile interval for 7856 = 22. Patients male to female ratio was 1: 0.84.

### CM Syndrome in T2DM

This study is based on large scale epidemiological investigation, induction and classification of symptoms were collected, and then find out the TCM syndrome type is recognized on the basis of professional knowledge. Because the system clustering variables are the syndrome integral, which belongs to the numerical variables; combined with the needs of professional, most can be classified into 7 types. The results shown in **Figure 1 & Figure 2**.

Type 2 diabetes mellitus combined with statistical results of above analysis of professional knowledge, eliminate all kinds of difficult to explain the pathogenesis of similar items (14 like to drink hot water, 25 diarrhea), sixth types of decomposition, the adjustment (10 spontaneous or moving the sweat, the 12 heat) to second (15 for no reason sighed, adjust to fifth) to adjust (22 frequency, nocturia; 23) to fourth categories, that clustered into the 5 category is reasonable, the clustering results are as follows:



**Figure 1** Analysis of TCM syndrome of type 2 diabetes mellitus clustering.

- a. **The first class:** 8 dry eyes feel tired; 16; 27 throat has a sputum; 28.; 29 love angry 30 feet; 31; depression; 32 chest distress dizziness; 34; 35 lips dark; 36 37 mouth bitter; viscosity; 38 of physical pain.
- b. **Second class:** 17 hands heart fever; 20 of tinnitus and deafness; 21 body or face fever; 26 skin ecchymosis; 39 flushing; 41 eyelids swollen; 10 spontaneous or moving the sweat; the 12 heat.
- c. **Third class:** 2 good appetite; 3, dry mouth and throat; 6 blurred vision; 7 love.
- d. **Fourth class:** 9 lumbar acerbity leg numbness of limbs soft; 11; 13 cold dry skin; 18; 19 and 24, and the cold; dry stool piss poor; 33; 22 and 23 for nocturia frequency.
- e. **Fifth class:** 1 pharyngeal foreign body sensation; 4 palpitations; 5; 40 acne or heat; 42 low sexual desire; 15 without a sigh.

According to the results of cluster analysis, poly common syndromes of type 2 diabetes include: fire, phlegm and blood stasis Qiyinliangxu stasis, liver, stomach, kidney yang deficiency, stagnation of the liver Qi Sheng five.

**CM Syndrome in DKD**

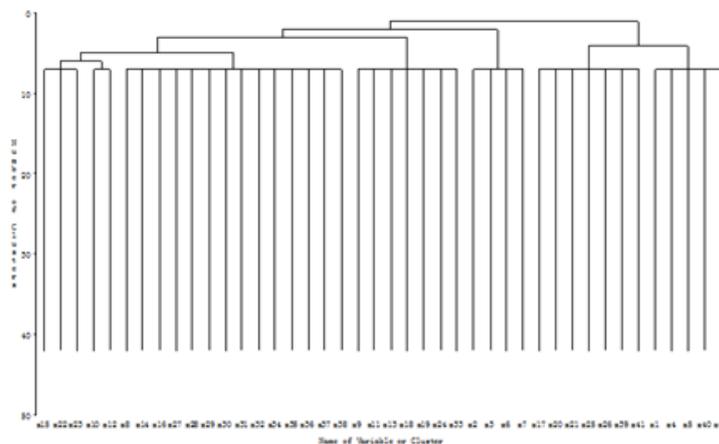
Combined with the professional knowledge of the statistical results of diabetic nephropathy, to exclude all kinds of difficult to explain the pathogenesis of similar items (5, 14 or 15 without a sigh, drink hot water, low sexual desire, 42) to (25 26 diarrhea, skin ecchymosis, 27 throat has a sputum, 29 love angry, 31 spirits, 34 dizziness) entry to second categories, that clustered into the 5 category is reasonable, the clustering results are as follows:

- a. **The first class:** 20 of tinnitus and deafness; 21 body or face fever; 22 frequent nocturia; 23; 24 dry stool.
- b. **Second class:** 25 diarrhea; 26 skin ecchymosis; 27 throat has a sputum; 29 love angry mood; 31; 34 dizziness; 35 37 mouth, lips dark; viscosity; 38 physical pain; 39 flushing; 40 acne or sore furuncle swollen eyelids; 41.
- c. **Third class:** 3 dry mouth and throat; 8 feel tired; 10 spontaneous or moving the sweat; 11 limbs; 28.; 30 of 32 feet; dyspnea; 33 poor urine.
- d. **Fourth class:** 1 pharyngeal foreign body sensation; 2 good appetite; 6 blurred vision; 7 love to talk; 12 heat dryness of the eyes; 16; 17 and 36 bitter heart fever.
- e. **Fifth class:** 4 palpitation; 9 backache leg soft cold dry skin; 13; 18; 19 knees, cold hands and feet.

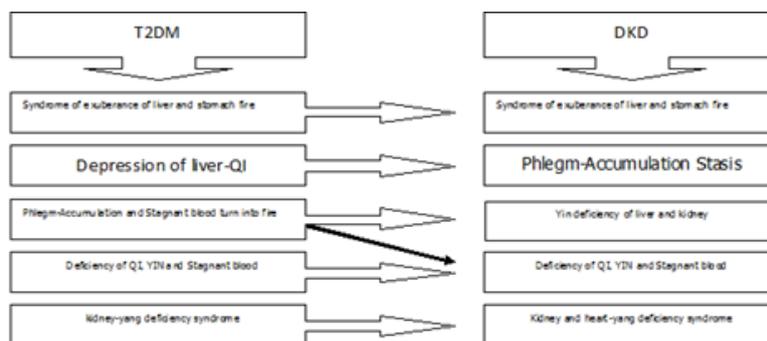
According to the results of cluster analysis, the common syndromes of diabetic nephropathy were included: deficiency of liver yin and kidney yin, stagnation of phlegm and blood stasis, deficiency of both qi and Yin stasis, liver, heart and kidney two empty stomach Sheng five.

**The evolution of TCM syndrome of diabetic nephropathy**

According to the type 2 diabetes mellitus and diabetic nephropathy syndrome of traditional Chinese medicine syndromes of the cluster analysis, it can be two pathogenesis evolutions (Figure 3).



**Figure 2** Analysis of TCM syndrome of Diabetic kidney disease clustering.



**Figure 3** Results compared with type 2 diabetes mellitus and diabetic nephropathy.

## Discussion

Diabetic nephropathy is one of the most common microvascular complications of diabetes, which belongs to the Chinese medicine “diabetes” secondary “kidney consumption”, “dropsy”, “off the grid” and other disease areas, with the aging of the population, economic development and the change of people’s lifestyle, type 2 diabetes mellitus and diabetic nephropathy incidence increasing global increased. In end-stage renal disease, by increasing the proportion of each year caused by type 2 diabetes mellitus, therefore in the treatment of type 2 diabetes has been increasing emphasis on the development of control and delay complications. Diabetic nephropathy is a constantly changing, the progressive development of the disease, once into the clinical albuminuria stage, will be irreversible deterioration to end-stage renal failure. TCM is the key to treatment of traditional Chinese medicine, is a bridge to link the theory of traditional Chinese medicine and clinical practice, therefore, to explore the pathogenesis of diabetic nephropathy, grasp the main pathogenesis, syndrome differentiation and accurate, is an important subject in research of type 2 diabetes mellitus and diabetic nephropathy in TCM syndrome relationship. Therefore, we use the “diabetes of TCM Syndromes of kidney disease questionnaire” investigation of epidemiology and TCM Syndromes of diabetic nephropathy group, using cluster analysis on the evolution of TCM syndrome types were analyzed and summarized.

In the case of disease, the occurrence and development of type 2 diabetes, there is a clinical signs and symptoms is not obvious, the development and change of Xiang Ming was not typical, typical and complicated process, according to the traditional concept in TCM, development and change there is a disease process. “Syndrome” in traditional Chinese medicine is to consider the different people, different regions, different period of the certificate, but as a common rule of the occurrence and development of diabetic nephropathy, there should be the same basic disease machine.

This study suggests that type 2 diabetes syndrome “hot” is the basic pathogenesis the pathogenesis characteristics, heat syndrome is the main syndrome; diabetic nephropathy occurs on the basis of phlegm, blood stasis and yang deficiency, blood stasis and other pathological product, as the main symptoms. We believe that diabetic nephropathy is based on the basis of type 2 diabetes mellitus, diabetic nephropathy study we found that covers the main syndrome of type 2 diabetes mellitus type, such as liver and stomach Sheng, Qiyinliangxu stasis for the two common syndromes; syndromes are further development on the basis of the prevalence of type 2 diabetes. Such as liver qi stagnation, Qi Stagnation with the passing of time, gas exchange resistance, blood stasis, and the development of stagnation of vital energy and phlegm stasis; phlegm fire, heat and Yin, yin deficiency of liver and kidney, deficiency of both qi and Yin with visible blood stasis syndrome; diabetes long, sinister and Yang, kidney yang deficiency, until the emergence of heart and kidney yang deficiency or yin deficiency syndrome. Yin and yang deficiency, yin and yang are interdependence, sinister and Yang results.

At present, the TCM Syndromes of diabetic nephropathy knowledge tends to be uniform, that the essence of syndrome of deficiency in origin and excess in superficiality syndrome. The analysis of 400 cases of type 2 diabetes and 237 cases of diabetic nephropathy with TCM Syndrome Distribution: the distribution characteristic of syndrome, the deficiency syndromes in type 2 diabetes, with two Qi and yin deficiency syndrome, and with the progression of diabetic nephropathy gradually sinister and Yang, yin and Yang Qi and blood are for the development of advanced deficiency, in line with the laws of nature of disease; in excess syndrome of type 2 diabetes, to

heat syndrome, mixing liquid filled hot, phlegm, phlegm and blood stasis, and blood stasis throughout the course of the disease as an object of type 2 diabetic nephropathy is the most common. With the Chinese “long into the network”, “water stop, blood stasis, blood stasis is consistent with water stop” theory. As the disease progresses, wet, phlegm and sthenia syndrome has become associated with the common, and the probability of heat syndrome is gradually reduced.

According to the results of this study show that: we believe that the basic pathogenesis of type 2 diabetes mellitus and diabetic nephropathy is deficiency in origin and excess in superficiality, and the focus is different, type 2 diabetes, deficiency of Qi and Yin, standard empirical to heat syndrome, and the attention should be paid to regulate the Qi syndrome; diabetic nephropathy with the Yin and Yang of the two virtual deficiency, blood stasis is an important subject of empirical throughout the course of disease, clinical application and dredging collaterals method on the virtual card. The essence of traditional Chinese medicine treatment of the disease is based on syndrome differentiation, treatment, delay the process of TCM Prevention than treatment of advantage, so the study of TCM Syndromes of diabetic nephropathy syndrome differentiation in evolution, and plays a key role in the traditional Chinese medicine treatment of diabetic nephropathy.

In addition, combined with the idea of the disease, the application of modern statistical methods, in-depth excavation of type 2 diabetes mellitus and diabetic nephropathy syndrome of traditional Chinese medicine has a very important significance to reveal the evolution of pathogenesis of the disease. Therefore, we in the same disease in different stages respectively by clustering analysis of TCM syndromes research, to discuss the evolution of syndrome disease, has a certain practical significance to further reveal the pathogenesis of the disease. Study on many domestic researchers of syndrome evolution using similar methods, such as Liu Shaoneng.<sup>6</sup> A cross-sectional survey method was used to study the evolution law of TCM Syndromes of chronic hepatitis B were studied, the research chose the same disease in different stages of development of the population, including chronic hepatitis B, early cirrhosis, liver cirrhosis as cites patients as the research object, analyzes the evolution of the syndrome, results suggest that chronic hepatitis B with the syndrome worse complexity has also undergone a corresponding change, performance for righteousness wasting aggravated, the increase of blood stasis syndrome. Yu Xiaoci.<sup>7</sup> of 339 cases of chronic renal failure patients is deficiency syndromes evolution rule of cross-sectional survey, which covers the compensatory stage of renal insufficiency, decompensated cirrhosis and uremia in different stages of disease development of patients, results suggest that chronic renal failure syndromes are deficiency of spleen and kidney qi deficiency (evolution is deficiency of both qi and Yin two), Yang deficiency of spleen and kidney, yin and Yang deficiency. Our research group.<sup>8,9</sup> had the investigation of patients with diabetic nephropathy stage were stratified, cross section in 180 cases, the results suggested that this disease is deficiency in origin and excess in superficiality characteristics, along with the progress of the disease, syndrome of blood stasis standard empirical tends to diversity, dampness, throughout the course of disease, provide the basis for the characteristics of machine and the further research of the syndrome of diseases disease.

## Conclusion

The study on the regularity of TCM syndrome of type 2 diabetes mellitus and diabetic nephropathy was generalized, the evolution of the syndrome is also a meaningful exploration, but there are still some problems, such as the choice of the people of different development

stages of the same disease, are summarized and then derive the evolution of the syndrome by certificate symptoms of disease in different stages of development, with a certain degree of subjectivity, cannot prove the existence of correlation between objective syndrome. Therefore, if a long time to follow up with a group of patients, to study and summarize the syndrome in the different stages of disease progression, it will prevent bias, the syndrome is more credible evolution.<sup>10</sup>

### Conflict of interests

The authors declare that there is no conflict of interests.

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