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Explaining the Mechanism of Diabetic Kidney Disease from Macro and Micro Viewpoints

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Abstract: ***Diabetic kidney disease is one of the major microvascular complications of diabetes mellitus. This paper summarizes the Chinese medicine theories such as "Zangxiang" and "qi, blood and fluid", and combs through the literature related to the identification and treatment of diabetic kidney disease from a microscopic point of view, to elaborate the clinical symptoms of diabetic kidney disease and the pathomechanisms of renal pathology from a macroscopic and a microscopic point of view. At the same time, we analyze the Chinese medicines used in the TCM treatment of diabetic kidney disease in the literature in the past 5 years, and discuss the internal organs related to the pathogenesis of diabetic kidney disease.***

Keywords: Diabetic kidney disease, Macro and micro, Pathogenesis**.**

1. Introduction

Diabetic Kidney Disease (DKD) is a common clinical microvascular complication of diabetes mellitus, whose main clinical manifestation is a persistent increase in the urinary albumin excretion rate and/or a progressive decrease in glomerular filtration rate. Data from the 10th edition of the IDF Diabetes Atlas, presented by the International Diabetes Federation, show that about 0.90 billion adults had diabetes in China in 2011, which has risen to 140 million in 2021 and is expected to increase to 164 million in 2030 [1]. As the number of people with diabetes grows, the prevalence of DKD will also increase further. A 2020 Epidemiologic Survey study showed that the overall combined prevalence of DKD in China has reached 21.8% [2]. DKD has become an important cause of chronic kidney disease (CKD) progressing to end-stage renal disease (ESRD) after primary glomerulonephritis [3]. DKD has become an important cause of chronic kidney disease progression to end-stage renal disease after primary glomerulonephritis. In recent years, traditional Chinese medicine (TCM) has shown strong advantages in treating DKD, but the efficacy of TCM is not significant due to the lack of standardization of evidence. With the in-depth study of DKD by Chinese medicine scholars, it is proposed to explore its treatment ideas from the macro and micro evidence perspective, which has a strong consensus. Based on this, this paper intends to explain the pathogenesis of DKD from the macro and micro perspectives, and at the same time, comb through the literature related to the treatment of DKD by Chinese medicine in the past 5 years, analyze the Chinese medicines used in the treatment of DKD, and further explain the pathogenesis of diabetic kidney disease, with a view to providing references for the clinical diagnosis and treatment of DKD.

2. Explain the Pathogenesis of DKD from a Macroscopic Perspective

DKD develops from thirst-quenching disease, which has a long course of disease with different pathologies at different stages. The Guidelines for Integrative Diagnosis and Treatment of Diabetic Kidney Diseases issued by the Chinese Society of Traditional Chinese Medicine categorize DKD into early, middle, and late phases according to the different stages of the disease.

2.1 Early DKD (Microalbuminuria Stage)

In the early stage of DKD, yin deficiency is the main symptom, but there is also qi deficiency, mixed with dampness-heat, phlegm-dampness and blood stasis [4]. In the early stage of DKD, the disease mechanism is centered on deficiency of kidney yin, which may be manifested as deficiency of liver and kidney yin, deficiency of spleen and kidney qi, internalization of dampness-heat, internalization of phlegm-dampness, and so on. The above changes in the pathogenesis can appear in the following early symptoms of DKD: (1) deficiency of kidney yin in the organism, its moisturizing and tranquilizing effect is weakened, and the function of internal organs is weak and hyperactive, which can be manifested in the five heart heat, hot flashes and night sweating. (2) Due to the "liver and kidney of the same origin", the yin of the liver and kidney nourish each other, kidney yin deficiency, liver yin loss of nourishment leads to the evidence of liver and kidney yin deficiency. Liver yin deficiency, yin does not control yang, hyperactivity of liver yang, then dizziness; liver orifices in the eyes, the eyes lost in the liver and kidney yin nourishment, manifesting dryness of both eyes, blurred vision, and so on. (3) Most of the patients with thirst-quenching have dietary disorders, and the qi of the spleen and stomach is damaged in the course of disease progression, coupled with the deficiency of kidney qi and the inability to help nourish the qi of the spleen and stomach, the evidence of spleen and kidney qi deficiency is formed. When the spleen is deficient in qi, it is unable to transport and transform the water and grains into essence and micro-distribution throughout the body, and when the body is deprived of nourishment, the patient shows symptoms of fatigue and lack of energy, as well as symptoms of laziness and laziness; and when the kidney qi is deficient in qi, and the waist is deprived of nourishment, the patient shows symptoms of lumbar and knee soreness. (4) Spleen deficiency and transportation malfunction, kidney deficiency and water dysfunction, vaporization and gasification is unfavorable, resulting in the metabolism of water dysfunction, stopping in

the body and eventually turned into dampness, phlegm and drink, and over time the accumulation of heat, into dampness and heat, phlegm and dampness of the evidence, manifested in the form of obesity, epigastric and abdominal distension and fullness, and the nativity and vomiting and malignant symptoms. (5) Liver is the main blood collector and spleen is the main blood regulator. Deficiency of liver yin and weakness of spleen qi will definitely affect the functions of both, resulting in blood not following the normal path, overflowing outside the veins and stagnation into blood stasis, therefore, some patients with early stage of DKD can have the symptoms of blood stasis such as purple tongue and tortuous veins under the tongue. (6) In Chinese medicine theory, the kidney has the function of "hiding essence", i.e. storing and sealing the essence of the human body, and when the kidney is deficient in qi, the hidden essence fails to perform its duty, and the essence of the human body leaks out with the urine, therefore, microalbuminuria is often seen in early DKD patients [6]. Therefore, early DKD patients often have microalbuminuria.

2.2 Mid DKD (Clinical Proteinuria Stage)

In the middle stage of DKD, qi and yin are depleted, and qi and yin deficiency is predominant in this stage, as well as yang deficiency, and dampness-heat, phlegm-dampness, and blood stasis are further aggravated, or even stasis-water and phlegm-stasis inter-conjugation are present [4]. In the middle stage of DKD, the disease mechanism is mainly characterized by deficiency of both qi and yin, and spleen and kidney yang deficiency, stasis and water stasis, phlegm and stasis stasis stagnation may occur. At this stage, the disease worsens and the systemic symptoms become more serious, with the following manifestations: (1) As the disease progresses, the body's qi and yin are further depleted, and qi and yin deficiencies are aggravated, such as heartburn and fever, hot flashes and night sweating, fatigue, and lack of energy and laziness, etc. Due to the depletion of positive qi and the inability to fight against evils, the patients are more susceptible to exogenous infections. (2) DKD disease for a long time yin loss and Yang, kidney yang weakness can not warm the spleen yang, spleen and kidney yang deficiency of the evidence, yang deficiency without warming the whole body manifested as lumbar and knee pain and weakness, cold limbs, cold symptoms, spleen yang weakness, transport and transformation of fluid ineffective, coupled with kidney yang deficiency, transpiration and qi powerlessness, fluid transmission obstacles, overflow of the skin with symptoms of oedema [5]. (2) The spleen is weak in this period, and the spleen is weak in transportation of water and fluid. (3) In this period, the transportation of the spleen and the water function of the kidneys are further impaired, the metabolism of water is impaired, and phlegm-dampness and dampness-heat are accumulated, coupled with a greater deficiency of qi, obstruction of the blood flow, and stasis of blood, phlegm-dampness, dampness-heat, and stasis of blood are more serious, so that they are intertwined with each other, which leads to the obesity, stuffiness and epigastric plumpness, dullness and vomiting, and other phlegm-dampness, and because of the stasis of blood, the skin, the body, and the meridians lose their nutritive power, which results in the occurrence of the symptoms of the skin, nail mistake, and pain and numbness of the limbs. (4) In this stage, the kidney qi is severely depleted, the kidney stores essence and fixes the ingestion, and the essence of the human body is leaked out with the urine, therefore, patients with DKD in this stage often show a large amount of proteinuria.

2.3 Late DKD

DKD to the late stage of the disease, yin damage and yang, qi and blood yin and yang are all weak, often with the heart and kidney yang deficiency as the prominent manifestation, mixed with turbid poison internal evidence [4]. The disease in this stage is critical, with the following specific manifestations. The condition of this stage is critical, the specific performance is as follows: (1) in the theory of Chinese medicine, the heart is the king fire, the kidney is the phase fire (life fire), the life fire secret storage, the heart can be full of yang, play its main blood, line qi and blood function [7]. The heart yang can only be abundant when the life fire is kept in secret, so that the heart yang can play its role as the master of blood vessels and the driver of qi and blood. When kidney yang is weakened, heart yang is also weak, and there is heart and kidney yang deficiency; when the organism is not warmed, the blood vessels are damaged, and the qi and blood run unfavorably, palpitations, palpitations, chest pain, chest tightness, chest pain, and coldness and limb coldness will occur. (2) Kidney has the duty of "gas", kidney gas failure, there is no way to take in the lungs inhalation of clear gas, gas loss of its root, so DKD patients often appear in the late stage of breath shortness, more than breathing less, move the gasping symptoms, and even appear to open their mouths to lift the shoulders, no lying down and other serious diseases. (3) the human body fluid generation, transmission, excretion is by the lungs, spleen, liver, kidney, stomach, bladder and many other organs to complete, the kidney for the internal organs of this, the warmth of the kidney gas to promote the role of vaporization of the organs to complete the water metabolism has an important role in coordinating the kidney qi failure, the kidney vaporization, the lungs of the waterway, the liver is the master of the excretion of spleen main transport of the job are damaged, and ultimately water metabolism disorders, urine generation, Excretion is impaired, metabolites cannot be excreted, phlegm-dampness, dampness-heat and blood stasis accumulate within the body, creating turbid toxins, resulting in a foul taste of urine in the mouth, frequent nausea and vomiting, deep and loud breathing, dark and sallow complexion, and withered and non-glorious skin, etc. If the turbid toxins interfere with the divine orifices, then there will be fainting, delirium, and other critical illnesses.[8] If the turbid toxin disturbs the divine orifices, then there will be dizziness and delirium.

3. Explaining the Pathogenesis of DKD from a Microscopic Point of View

The clinical symptoms of DKD are not consistent with the severity of renal microstructural damage, and renal puncture biopsy can visually reflect the severity of renal damage. With the development of modern medicine, the integration of renal puncture biopsy as an extension of traditional Chinese medicine (TCM) system of diagnosis has been increasingly recognized by TCM practitioners, and the following article describes the pathomechanisms of DKD from the microscopic point of view by combining with the contents of DKD renal

pathological changes.

3.1 Immunofluorescence

Immunofluorescence pathology examination of renal biopsy samples from DKD patients shows that IgG is deposited along the glomerular capillary walls and tubular basement membranes, and IgM is deposited in the areas of renal damage such as proliferative zones of the thylakoid membranes, vitellogenic arterioles, and glass droplet changes in the renal capsule.[9] Immunoglobulins such as IgG and IgM deposited in renal tissues will damage the cells at the site, and the damage to the thylakoid cells, epithelial cells, and vascular endothelial cells can further release a large number of inflammatory mediators, reactive oxygen species, protein kinases, cytokines, growth factors, etc., which can aggravate the damage to the local structure and function of the glomerulus. Glomerular lesions are inevitably secondary to tubular and interstitial damage. In DKD patients, due to the increase in urinary glucose, tubular reabsorption of glucose increases, which has a toxic effect on the tubular epithelial cells, coupled with plasma protein deposition, a variety of inflammatory factors are activated, reactive oxygen species and protein kinase increase, tubular damage, and the interstitium of the kidney is secondary to inflammatory reaction and fibrosis.[9]. The plasma proteins such as IgG and IgM deposited in renal tissues, glucose reabsorbed by renal tubules, and the secondary increase of inflammatory mediators, reactive oxygen species, protein kinases, cytokines and growth factors, etc., all cause great damages to the renal tissues. The above substances can be categorized into the category of Chinese medicine's "poisonous evils", and the process of their damages to the glomeruli and tubules can be summarized as follows The pathogenesis of "poisonous evil injuring kidney".[10] The process of damage to the glomeruli and tubules can be summarized as the pathogenesis of "toxicity injuring the kidney".

3.2 Light Microscopy

DKD renal pathologic damage observed under light microscopy is diverse and involves glomeruli, tubules, interstitium, and renal vasculature. (1) Glomerulus: Pathologic damage of the glomerulus includes glomerular capillary basement membrane thickening, thylakoid cells, thylakoid stromal hyperplasia, nodular diabetic glomerulosclerosis, glomerular glomerulosclerosis and barrenness, microangioma formation, and capillary collaterals with fibrinoid capillary-like lesions. (2) Renal tubules and renal interstitium: the lesions of renal tubules and renal interstitium match the glomerular lesions. At the initial stage, renal tubules and renal interstitium may have no obvious lesions or vacuoles and granular degeneration of renal tubular epithelial cells and inflammatory cell infiltration of renal interstitium may be observed. With the sclerosis and desertion of glomeruli, renal tubular atrophy and renal interstitial fibrosis appear. (3) Renal vasculature: renal vasculopathy includes thickening of the wall of small arteries, narrowing of the lumen, and vitellosis.

DKD glomerular capillary basement membrane thickening, thickening of thylakoid cells, thylakoid stromal hyperplasia pathology has the property of "growth", belongs to the "yang", and has a tangible form, which can be categorized as a real evidence, the above proliferative pathology changes in the failure to treat, mis-treatment, after the performance of lingering characteristics of difficult to heal The above proliferative pathologic changes show lingering and difficult to cure characteristics after untreated or mistreated, which are similar to the characteristics of Chinese medicine, which is characterized by the heavy and turbid stickiness of dampness, which is difficult to cure after causing disease [11]. This kind of pathological changes can be summarized as the pathogenesis of "internal dampness". Small artery vitreous lesions, capillary collaterals fibrin-like capillary lesions are exudative lesions, formed by plasma proteins infiltrated into the endothelium, this type of pathological changes with the Chinese medicine phlegm and drink of the evil with the qi and blood flow all over the body, stagnation in the meridians and tissues and the onset of the disease of the interstitial space is more similar to the pathogenic characteristics of the two types of pathology can be attributed to the phlegm obstruction of renal collaterals. Therefore, these two types of pathological changes can be categorized as "phlegm obstructing the kidney channels". The formation of microangioma, thickening of small arterial wall and narrowing of lumen are caused by the damage of vascular wall or the change of microcirculation function and blood rheology, and the formation of such pathological changes will further hinder the blood operation of kidney, leading to the progression of the disease, and the pathological process is highly similar to the pathogenesis of "blood stasis" of traditional Chinese medicine (TCM).[12-14], therefore, such pathologic changes can be summarized as "In the middle and late stages of DKD, the pathological products of "phlegm, dampness, stasis and toxicity" accumulate in the renal capital, and "toxic heat" further burns the camp to become stasis, and refines the fluid to become phlegm, which eventually becomes phlegm, Stasis and dampness are intertwined to form nodular glomerulosclerosis, glomerulosclerosis and barrenness, tubular atrophy, interstitial fibrosis, etc. This pathological process can be summarized as the pathogenesis of "accumulation of renal complexes" [10]. This pathological process can be summarized as the pathogenesis of "accumulation of kidney channels".

4. Elaboration of the Pathogenesis of DKD from the Perspective of Categorization of Traditional Chinese Medicines Used in Effective Cases of DKD Treatment Reported in the Literature

The categorization of traditional Chinese medicine is the concept of positioning of drug action, which can be a visual response to which organs play a pharmacological role, and the disease is closely related to the location of the disease. The theory of Chinese medicine to meridian is based on the theory of internal organs and meridians, based on the therapeutic effect of the treatment of the disease, summarized through repeated clinical practice [15]. The theory of categorization of Chinese medicine is based on the theory of internal organs and meridians. Therefore, to analyze the treatment of disease drugs used in the meridian, can indirectly explain the disease is caused by the dysfunction of which viscera.

The research group summarized and analyzed the 351 effective literature reports on TCM treatment of DKD published in the "China Knowledge Network, Wanfang Data Knowledge Service Platform, and Wipo Chinese Science and Technology Journal Database" in the past 5 years, among which 101 documents were for clinical research on TCM treatment of DKD stage III (microalbuminuria), and all of them involved 264 Chinese medicines. There are 264 flavors of traditional Chinese medicines, with a cumulative frequency of 4, 361 times. In this paper, we select 26 flavors of medicines with a frequency of use greater than 1% and analyze their attribution to the meridians (see Table 1 for details). 3 flavors of traditional Chinese medicine to the large intestine meridian, 1 flavor of traditional Chinese medicine to the gallbladder meridian.

The 26 flavors of HF Chinese medicines were classified as 10 flavors of deficiency tonic (6 flavors of qi tonic, 3 flavors of yin tonic and 1 flavor of blood tonic), used 1128 times, 6 flavors of blood circulation and stasis activator, used 541 times, 2 flavors of water-inducing and dampness-dispersing medicines, used 357 times, 3 flavors of astringent medicines, used 279 times, 2 flavors of heat-cleansing medicines, used 234 times, 1 flavor of laxative medicines, used 65 times, and 1 flavor of liver-relieving and wind-relieving medicines, used 46 times. 1 flavor, used 48 times, 1 flavor, used 46 times.

From the point of view of meridian categorization of HF Chinese medicines, the meridians categorized by Chinese medicines used in DKD treatment are mainly liver, spleen and kidney, followed by lung, heart and stomach. The liver is the main reservoir of blood, the kidney is the main reservoir of essence, essence and blood have the same origin, and they are born from each other. The blood stored in the liver continuously nourishes the blood stored in the kidneys, so if the blood in the liver is sufficient, the essence in the kidneys will be sufficient [16]. Therefore, when liver blood is sufficient, kidney essence is sufficient. The spleen is responsible for the ascension and purification, "the spleen spreads the essence and returns it to the lungs", the essence of water and grains born by the spleen is transmitted to the whole body through the lung's propagation and dissemination, playing the role of moistening and nourishing, and through the lung's purging, it is transmitted to the kidneys, which are stored by the kidneys to nourish the essence of the innate nature, and with the synergistic relationship between the three viscera, the essence of the innate essence is stored internally and is not leaked out [17]. The three organs work together to keep the essence inside but not outside. The liver is responsible for draining and regulating the qi of the whole body, which in turn promotes the operation of blood and fluid, the lung is the source of water, and is responsible for regulating the water channel, the spleen is responsible for transporting water and grains, and the kidney qi is responsible for regulating the water metabolism of the whole body, and all the organs work together to complete the human body's water metabolism. Through the analysis of drug attribution, we can further see that the progression of DKD is closely related to the dysfunction of liver, spleen, kidney and lung.

From the perspective of HF Chinese medicine drug categories, the Chinese medicines used in the treatment of DKD were mainly those that tonify deficiency, activate blood circulation and remove blood stasis, diuretic and dampness, astringent and heat-clearing, and among the deficiency tonic medicines, qi tonic medicines were used the most, followed by yin tonic medicines. This suggests that DKD is treated with the therapeutic concepts of benefiting qi and nourishing yin, astringent and solidifying astringency to support positive qi, and activating blood circulation and removing blood stasis, inducing diuresis and seeping dampness, and treating both symptoms and evils. The therapeutic ideas of activating blood circulation, removing blood stasis and seeping dampness are also consistent with the microscopic pathogenesis of "internalized dampness and stasis blocking the kidney channels", which further proves the existence of the pathological factors of "stasis and dampness" in the microscopic diagnosis of DKD.

Table 1: Statistical table of 351 articles with a frequency of use of more than 1% of traditional Chinese medicines in the literature

veterinary drug	frequency	frequency	attribution of channels of TCM	Class of drugs
milk vetch root (used in TCM)	298	6.83%	Lungs, Spleen	medicine for treating weakness
Wolfiporia extensa (a wood-decay fungus)	220	5.04%	Heart, Lungs, Spleen, Kidneys	medicine that induces diuresis and seeps dampness
Salvia miltiorrhiza	203	4.65%	Heart, Liver	medicine that activates blood circulation and removes blood stasis (TCM)
Dioscorea opposita	184	4.22%	Spleen, Lungs, Kidneys	medicine for deficiency
herb associated with longevity	178	4.08%	Liver and Kidney	astringent
Senna laxative	137	3.14%	Kidney, bladder	medicine that induces diuresis and seeps dampness
Chinese foxglove (Rehmannia glutinosa), its rhizome used in TCM	132	3.03%	Heart, Liver, Kidney	medicine clearing heat (e.g. Chinese medicine)
Radix Rehmanniae Praeparata (botany)	111	2.55%	Liver and Kidney	medicine for deficiency
peony bark	102	2.34%	Heart, Liver, Kidney	medicine clearing heat (e.g. Chinese medicine)
poor man's ginseng (Codonopsis pilosula)	99	2.27%	Spleen and Lung	medicine for deficiency
Angelica sinensis	97	2.22%	Liver, Heart, Spleen	medicine for deficiency
Atractylodes macrocephala	92	2.11%	Spleen and stomach	medicine for deficiency
leech	90	2.06%	pancreas	medicine that activates blood circulation and removes blood stasis (TCM)
persimmon	88	2.02%	Liver, Gallbladder, Pericardium	medicine that activates blood circulation and removes blood stasis (TCM)
licorice	70	1.61%	Spleen and stomach	medicine for deficiency
Chinese rhubarb	65	1.49%	Spleen, Stomach, Large Intestine, Liver, Pericardium	laxative
asparagus	63	1.44%	Heart, Lungs, Stomach	medicine for deficiency

goji berry	62	1.42%	Liver and Kidney	medicine for deficiency
safflower (Carthamus tinctorius)	59	1.35%	Heart, Liver	medicine that activates blood circulation and removes blood stasis (TCM)
peach kernel, used in Chinese medicine	55	1.26%	Heart, Liver, Large Intestine, Lungs	medicine that activates blood circulation and removes blood stasis (TCM)
codonopsis root (used in TCM)	52	1.19%	Lungs, Spleen	medicine for deficiency
Semen euryales (botany)	51	1.17%	Spleen and Kidney	astringent
golden takura (Acanthopanax senticosus)	50	1.15%	Kidneys, bladder, large intestine	astringent
Tyrannosaurus spp.	48	1.10%	Liver, Spleen, Bladder	medicine that calms the liver and restores wind
tuber of the kudzu vine (Pueraria lobata) used in Chinese medicine	46	1.05%	Spleen, Stomach, Lungs	antipyretic (antibiotic)
motherwort (Leonurus heterophyllus or L. cardiaca)	46	1.05%	Liver, Pericardium, Bladder	medicine that activates blood circulation and removes blood stasis (TCM)

5. Summary

DKD has a long course and its pathogenesis is in constant evolution. From the typical symptoms of DKD early, middle and late phases and the analysis of DKD HF in the literature, the mechanism of its occurrence is consistent with the characteristics of the disease caused by the malfunction of the kidney in storing essence, the main body of the yin and yang of the viscera and organs, the main division and regulation of the body's water metabolism, the spleen in transporting and transforming water and grains, the liver in storing blood in the blood and the main excretory, the lungs in the main propaganda and purgative, and the malfunction in regulating the water channel, which is manifested as the essence not being stored in the urine and the excretion of proteinuria, and the obstruction of the metabolism of the water and fluid. The body loses the nourishment and tranquility of yin fluid or the warmth and promotion of yang qi, and pathological products such as stasis, dampness and phlegm accumulate in the body. From the point of view of HF Chinese medicine drug category, DKD Chinese medicine treatment mostly adopts the therapeutic idea of benefiting qi and nourishing yin, astringent and astringent to support positive qi, activating blood circulation and removing blood stasis, diuresis and seepage of dampness and treating the symptoms and evils at the same time.

From the perspective of microscopic diagnosis, there is no "false evidence" of DKD kidney injury, and the deposition of immunoglobulins such as IgG and IgM in renal tissues, hyperplasia of glomerular capillary basement membranes, proliferation of thylakoid cells and thylakoid stroma, the formation of K-W nodules, the formation of microangiomas, and vitellogenic degeneration of arterioles are all substantial pathologic products, which can be attributed to the categories of phlegm, dampness, stasis, and toxicity. They can be categorized as phlegm, dampness, stasis and toxicity in Chinese medicine. When phlegm, dampness and stasis accumulate, toxicity burns the camp as stasis, refining liquid into phlegm, making phlegm and stasis worsening day by day, and eventually forming renal complex accumulation evidence such as glomerulosclerosis and barrenness, renal tubular atrophy, and renal interstitial fibrosis. Prof. Lu Renhe, a master of national medicine, called this kind of renal complex accumulation as "miniature obstruction in the abdomen". In treating DKD, he emphasized the treatment of activating blood circulation and removing blood stasis on the basis of holistic diagnosis and treatment, softening and dispersing hardness and knotting, and often added and subtracted Danshen, Taoren, Paeoniae Lactiflora, Ligusticum Chuanxiong, Sanleng, Curcuma longa, leeches, Turbellariae, and Liuhuinu, etc. as appropriate to the case [18]. The treatment of DKD has been reported in the literature. Analysis of the drug classes of high-frequency Chinese medicines used in the treatment of DKD reported in the literature revealed that, in addition to the drugs that tonify the deficiency, the most frequently used drugs were those that invigorate blood circulation and eliminate blood stasis. The theoretical reasoning is consistent with the analysis of the literature data, further indicating the effectiveness of the blood activation and blood stasis treatment from the microdiagnostic perspective of DKD.

Based on Chinese medicine theory and clinical literature, this paper explains the clinical manifestations of DKD and the pathogenesis behind the renal pathological changes from both macro and microscopic perspectives. However, there are some deficiencies in this paper, for example, the pathogenesis behind the renal pathological changes in DKD is mostly established by the method of taking the image and comparing with the analogy method, which is lack of support from the clinical objective data, and the correlation between renal pathological changes and Chinese medicine symptoms can not only provide a reference for the Chinese medicine treatment of DKD, but also provide an objective basis for the standardization of Chinese medicine symptoms in DKD. In the future, the correlation between renal pathological changes and TCM symptoms can be further explored through retrospective analysis of clinical data, which will not only provide a reference for the TCM treatment of DKD, but also provide an objective basis for the standardization of TCM symptoms of DKD.

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