A Comparative Analysis of Traditional Chinese Medicine and Western Medicine in Chronic Kidney Disease Treatment

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Abstract: This paper explores the differences and synergies between Traditional Chinese Medicine (TCM) and Western Medicine in treating Chronic Kidney Disease (CKD). CKD is a growing health issue worldwide, significantly impacting patients' lives and increasing the risk of heart disease and premature death. Western Medicine primarily addresses CKD through dialysis and medications like SGLT-2 inhibitors, which manage symptoms and slow disease progression but come with side effects and high costs. On the other hand, TCM offers a holistic approach that focuses on restoring the body's balance using herbal remedies, aiming to treat the root causes of CKD and improve overall well-being. The paper compares how Western Medicine's targeted treatments and TCM's holistic methods can complement each other. While Western approaches provide quick relief and clear clinical benefits, TCM's therapies can mitigate side effects, support kidney function, and reduce oxidative stress, particularly in late-stage CKD. The integration of both systems could offer a more effective, cost-efficient treatment strategy, improving the quality of life for CKD patients. The paper advocates for a combined approach, using the strengths of both Western and Traditional Chinese Medicine to offer a comprehensive treatment plan for CKD.

Keywords: Traditional Chinese Medicine; Western medicine; Chronic Kidney Disease

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1. Introduction

Chronic kidney disease affects more and more people every year. It's marked by a glomerular filtration rate (GFR) of less than 60 ml/min/1.73 m² with signs of kidney damage, such as metabolic disorders and renal hypertension. (Zhao, Yu et al. 2021) This condition is becoming a major public health issue because it's so common and it raises the risk of end-stage renal disease (ESRD), heart problems, and early death. Around 8-16% of the global population suffers from CKD, with 78% of cases found in middle and low income countries. People with CKD are five to ten times more likely to die early than to progress to ESRD. In CKD, the kidneys can't remove extra fluid, leading to fluid buildup and high blood pressure, and it often causes anemia, making the heart work harder and contributing to heart disease. (Säemann, Cejka et al. 2023) The risk of dying, especially from heart disease, goes up significantly as kidney function declines. (Zhao, Yu et al. 2021)

The most common hypothesis in Western medicine is that the main cause of CKD is diabetes, which together account for 75% of cases. Diabetes is a metabolic disease where long-term high blood sugar damages the glomeruli and tubules, leading to CKD by injuring the filtration membrane and causing large molecules like proteins to enter the urine, while also preventing timely removal of metabolic waste from tubular cells, resulting in tubulointerstitial disease. (Shen, Zhong et al. 2024) Treatment methods mainly include controlling blood sugar, cholesterol, and blood pressure. (Persson, Borg and Rossing 2021) When CKD reaches stage 5, also known as uremia, the glomerular filtration rate will be less than 15ml/min, which means the kidney no longer filters waste from the body, patients

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usually die without dialysis in five days. Treatments include peritoneal dialysis, hemodialysis, and kidney transplants. These treatments can significantly burden patients, by lowering their guality of life and shortening their life expectancy, as well as causing high hospitalization costs for the patients. (Säemann, Cejka et al. 2023) On the other hand, traditional Chinese medicine (TCM) follows the principles of "holistic view" and "treatment based on syndrome differentiation." (Zhao, Yu et al. 2021) TCM views the body as a whole, using the traditional Chinese principles of yin and yang to represent energy in the body. "Yin deficiency" means not enough fluids and kidney essence. "Excess Yin" is too much cold and moisture. "Yang deficiency" means low heat and energy, causing low body temperature. "Excess Yang" can be from too many worries causing too much energy in the liver or too much heat in the stomach and intestines. TCM also used five elements to represent different organs. It associates the kidneys with water and the spleen and stomach with earth, noting that earth controls water. From a TCM perspective, CKD involves weaknesses in various organs, deficiencies in both gi and vin, spleen and kidney yang deficiency, and kidney yang failure (energy weakness in the body). Therefore, TCM has developed a unique "spleen-strengthening and kidney-tonifying" therapy (jianpibushen therapy).(Li, Li et al. 2020) Using the unique ingredients in Chinese herbal medicine to nourish the spleen and stomach first and then treat chronic kidney disease, TCM not only cure the patients in clinical practice, but also reduced the treatment burden on patients so that more patients can receive effective treatment. Integrating TCM herbal treatments with Western medical approaches not only complements conventional therapies for CKD and its complications but also helps ease patients' daily life stress. This review compares the different focuses of Chinese and Western medicine in treating CKD and discusses how combining them can provide better treatment for patients.

2. Body

Western medicine treatment of CKD relies heavily on the use of dialysis. While dialysis can remove waste from the body, it comes with high risks. Long-term dialysis can cause oxidative stress, leading to kidney tissue fibrosis, inflammation, and increased risks of cardiovascular diseases and infections. (Nakayama, Kabayama and Miyazaki 2024) To combat oxidative stress, Western medicine uses electrolyzed hydrogen water (EHW) for both dialysis and ingest. This water is made by electrolysis, resulting in mildly alkaline water with dissolved hydrogen molecules. Studies have shown that EHW can increase the estimated glomerular filtration rate (eGFR) and reduce urinary oxidative stress markers. It can also replace regular dialysis fluid, reducing oxidative stress and improving the redox state in hemodialysis patients, protecting cells and lowering the risk of cardiovascular complications. (Nakayama, Kabayama and Miyazaki 2024)

Despite these benefits, Western medicine hasn't developed effective drugs for oxidative and Inflammation. In traditional Chinese terms, this approach "treats the symptoms but not the root cause." However, traditional Chinese medicine (TCM) and herbal remedies can offer good antioxidant and anti-inflammatory methods as supplements. Various clinical trials and meta-analyses have shown that Salvia miltiorrhiza, commonly known as Danshen, and its extract, salvianolic acid A, can reduce oxidative stress caused by advanced glycation end products (AGE), which will further damage kidney tissues and worsen the progression of the disease.(Zhao, Yu et al. 2021) Inflammation damage mitochondria, leading to less energy production and more cell death, which worsens kidney function. Astragalus mongholicus, particularly its active component Astragaloside IV, can help by restoring mitochondrial stability,(Shuning Liu 2021) (figure 1) especially through the TGF-β1/Smads and TLR4/NF-κB pathways, which are involved in the inflammation and damage seen in CKD.(Shen, Zhong et al. 2024) These two herbs can be perfectly combined without side effects, along with hawthorn, to create the ancient Chinese remedy "Three-Ingredient Tea," known for its antioxidant and cardiovascular protective effects. For patients, a 50-day supply of Three-Ingredient Tea, Costs only \$11.8, making it an affordable and effective option against oxidative and Inflammation in dialysis. Using TCM alone can't replace dialysis, and dialysis alone can't eliminate oxidative stress. But when combined, they



complement each other perfectly, increasing the survival rate of CKD dialysis patients. (Zhao, Yu et al. 2021)

Figure 1 shows how Astragaloside IV (AST) protects kidney cells from damage caused by deoxysphinganine (doxSA).(刘淑宁 2021)

In experiments, kidney epithelial cells (HK-2) exposed to 62.5 µg/mL of doxSA showed significant mitochondrial damage and decreased ATP levels, with ATP content dropping to 44.06±3.61%. This was a stark contrast to the control group's ATP level of 100.00±2.21%. When AST was added to the damaged cells, ATP levels improved to 64.51±4.20%, demonstrating AST's protective effect. In terms of mitochondrial activity, Rhodamine123 staining in Panel A revealed that doxSA exposure reduced mitochondrial activity (blue), while AST treatment restored it (green). TOMM20 staining in Panel B showed that doxSA caused mitochondrial fragmentation (blue), but AST helped preserve the mitochondrial structure (green). A heatmap (Panel C) indicated high oxidative stress in the doxSA group, which was significantly reduced with AST treatment. These experiments were repeated multiple times, confirming that AST consistently reduced oxidative stress and mitochondrial damage, highlighting its potential in protecting kidneys from chronic disease progression.

For patients with early to mid-stage CKD, their kidney function hasn't completely failed yet, but CKD is a progressive disease often caused by diabetes. Persistent high blood sugar can lead to endothelial damage, oxidative stress, and structural changes in the kidneys, pushing CKD into next stage. CKD-induced high blood pressure and fluid overload can further lead to heart failure and myocardial infarction.(Persson, Borg and Rossing 2021) Western medicine approaches treatment by making new drugs to address specific symptoms. The DURATION-8

trial evaluated the combination of dapagliflozin (an SGLT-2 inhibitor) and exenatide (a GLP-1 RA) for treating CKD and its cardiovascular complications.(Tarun, Ghanta et al. 2024) They found that SGLT-2 inhibitors can control blood sugar, reduce albuminuria, promote diuresis, and lower glomerular pressure to improve renal hemodynamics, reduce blood volume and pressure, thereby slowing the decline in kidney function.(Persson, Borg and Rossing 2021) Research on dapagliflozin, a typical SGLT-2 inhibitor, shows that it can reduce composite renal outcomes by 39%. (figure 2) This means it can slow the decline in the glomerular filtration rate (eGFR), reduce the risk of progressing to end-stage kidney disease (ESKD) which requires dialysis or transplantation, and lower the probability of cardiovascular death due to declining kidney function by 39%.(Säemann, Cejka et al. 2023) Glucagon-Like Peptide-1 Receptor Agonists (GLP-1 RAs) offer significant benefits for kidney and cardiovascular outcomes in CKD patients. GLP-1 RAs have demonstrated a 21% reduction in composite renal outcomes and can reduce the incidence of major adverse cardiovascular events (MACE) by 14%.(Tarun, Ghanta et al. 2024) This reduction includes a lower risk of heart attack, stroke, and CV-related death, providing cardiovascular protection and lowering the risk of death due to heart failure in CKD patients.



Figure 2: Efficacy of Dapagliflozin in Reducing Kidney Disease Progression and Albuminuria in CKD Patients: Insights from the DAPA-CKD Trial(Säemann, Cejka et al. 2023)

This figure illustrates the significant benefits of dapagliflozin observed in the DAPA-CKD trial, leading to the early termination of the study due to the overwhelming positive results. The graph on the left (Figure 3a) shows that dapagliflozin significantly reduced the cumulative incidence of a sustained decline in eGFR by 50% or more, progression to end-stage kidney disease (ESKD), or death from renal or cardiovascular causes, by 39% compared to the placebo. The graph on the right (Figure 3b) highlights the drug's antiproteinuric effects, demonstrating a reduction in albuminuria progression in both diabetic and non-diabetic patients, thus confirming dapagliflozin's role in preserving kidney function and improving clinical outcomes for CKD patients.

In treating CKD and its complications, traditional Chinese medicine (TCM) takes a holistic approach, emphasizing both symptom relief and addressing root causes. TCM aims to restore the body's balance of the "Five Elements" and "Yin-Yang," which means restore the energy balance of the organs in the body, showcasing its strengths in preventing disease and stopping progression in its tracks.(Li, Li et al. 2020) According to TCM, the spleen and

kidneys are fundamental, with the spleen managing fluid transportation and the kidneys governing water. Chronic illness can strain these organs, leading to deficiencies that result in protein loss and edema. TCM explains CKD's primary mechanisms as "deficiency," "stagnation," and "toxicity." (Wu Qunli, Yang Dan, and Liang Xiaochun 2020) The deficiency, mainly in the spleen and kidneys, is the fundamental issue, starting with a qi deficiency that progresses to yang deficiency.(Li, Li et al. 2020) Stagnation in the kidney channels and internal toxin buildup are contributing factors that persist throughout the disease. The "Jianpi Bushen" formula(Strengthens the spleen and kidneys)(Li, Li et al. 2020), developed by TCM, includes 16 herbs: Eclipta, Ligustrum, Astragalus, Poria, Alisma, Polyporus, Houttuynia, Smilax, Rhubarb, Motherwort, Lycopus, Wax Gourd Peel, Adzuki Bean, Dandelion, Hemp Seed, and Ramie Root. Extracts from Ligustrum and Eclipta (oleanolic acid and ursolic acid) help lower blood sugar and lipids, and protect the heart. Astragalus strengthens the spleen and kidneys, reduces swelling, promotes blood flow, and improves kidney function. Poria, Alisma, and Polyporus work together to strengthen the spleen and drain excess fluids. The remaining herbs, like Houttuynia, Smilax, Rhubarb, and others, clear heat, detoxify, reduce dampness, promote blood circulation, and enhance diuresis, which helps reduce fluid retention from CKD and protect the heart. (Wu Qunli, Yang Dan, and Liang Xiaochun 2020) Additionally, key herbs in the formula—Astragalus, Eclipta, Ligustrum, Motherwort, and Adzuki Bean—are effective in treating anemia, a common CKD complication.(Li, Li et al. 2020)

3. Conclusion

For treating CKD, both Western and Traditional Chinese Medicine (TCM) have their own approaches. In the early and middle stages of CKD, Western medicine uses targeted treatments with SGLT-2 inhibitors and GLP-1 Ras to protect the kidneys and slow down the disease's progression. TCM, on the other hand, takes a holistic approach, using herbal formulas to strengthen the spleen and kidneys and restore kidney function. Both methods can slow CKD progression and protect the kidneys and related cardiovascular health. For late-stage CKD, Western medicine uses electrolyzed hydrogen water (EHW) instead of traditional dialysis fluids and water. This can help reduce infections, inflammation, and cardiovascular issues caused by oxidative stress from dialysis. TCM plays a supportive role in late-stage CKD, using herbs like Salvia miltiorrhiza and Astragalus mongholicus to stabilize mitochondria and reduce oxidative stress from dialysis. Combining Western and TCM approaches can provide a more cost-effective and efficient treatment, increasing the survival rate for CKD patients.

4. Opinion

In summary, I believe treating CKD should use a more comprehensive approach, combining the strengths of both Western and Traditional Chinese Medicine (TCM). This means using Western medicine's targeted treatments along with TCM's holistic methods at every stage of CKD. (Jing Kaile and Du Yingjie 2021) Western medicine should be the primary method, with TCM as a support, to fully leverage the advantages of both.

Western medicine's extensive clinical knowledge can provide accurate diagnoses and prescribe effective drugs. Western medicine works quickly and has clear mechanisms, which is helpful for patients needing rapid improvement and those in late-stage CKD requiring dialysis. However, we must watch for potential side effects, like the increased risk of urinary tract infections from the higher glucose levels in urine caused by SGLT-2 inhibitors like dapagliflozin, or the increased risk of diabetic ketoacidosis from higher free fatty acid levels due to lowered insulin. (Xu Qi, Fu Jia, and Han Rui 2020)

These side effects and complications can be managed and prevented with TCM. For example, herbs like Salvia miltiorrhiza and Astragalus mongholicus can reduce oxidative stress from dialysis(Zhao, Yu et al. 2021), and TCM methods like strengthening the spleen and kidneys can also fight inflammation and treat urinary tract infections(Li, Li et al. 2020). TCM has the unique benefits of significantly improving clinical symptoms, having fewer side effects,

and being safer. (Jing Kaile and Du Yingjie 2021) It helps restore balance in the body's organs. Additionally, herbal medicine is cheaper than Western drugs, reducing the financial burden on patients, though it may work slower. Therefore, using herbal medicine to prevent the side effects of Western drugs while slowly restoring organ balance in CKD patients can greatly improve their treatment experience and quality of life.

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