



## Review article

## Food strategies of renal atrophy based on Avicenna and conventional medicine

Marjan Mahjour<sup>a, e</sup>, Arash Khoushabi<sup>b, f</sup>, Maryam Miri Ghale Novi<sup>c, g</sup>, Zohre Feyzabadi<sup>d, \*</sup><sup>a</sup> Students Research Committee, Department of Persian Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran<sup>b</sup> Health Department, Mashhad University of Medical Sciences, Mashhad, Iran<sup>c</sup> Kidney Transplantation Complications Research Center, Department of Internal Medicine, Ghaem Hospital, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran<sup>d</sup> Department of Persian Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

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## ABSTRACT

Kidneys have an important role in the body. Any damage to kidney role can damage many organs of the body. Traditional Persian Medicine (TPM) or Iranian traditional medicine (ITM) is an ancient temperamental medicine with many literatures about kidney diseases and Avicenna (980–1025 AD) describes kidney diseases in details. This is a review study by searching of the most important clinical and pharmaceutical TPM textbooks such as The Canon of Medicine by Avicenna and scientific data banks using keywords such as “Hozal-e-Kolye”, renal atrophy, tubular atrophy, kidney, chronic kidney disease, and end stage renal disease. This paper found that “Hozal-e-Kolye” in TPM texts is the same tubular atrophy in conventional medicine due to some similar symptoms between them. Lifestyle modification and use of proposed foodstuffs can be considered as a complementary medicine in addition to conventional treatments to manage these patients. TPM scholars prescribed some foodstuffs such as camel milk, sheep's milk and *Ficus carica* for this disease as a complementary management. This study aimed to explain HK (the same tubular atrophy considering their similar symptoms) and introduce some foodstuffs. It seems using of foodstuffs affecting tubular atrophy based on TPM literatures can has a role as a supplemental method in company with conventional medicine management.

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## 1. Introduction

Chronic kidney disease (CKD) can lead to end stage renal disease (ESRD).<sup>1</sup> Renal atrophy is one of the kidney diseases occurring due to shrinkage of the kidney in which the nephrons are lost and tubular atrophy is the loss of parenchymal renal cells characterizing in CKD.<sup>2</sup> Tubular atrophy is a hallmark of chronic kidney disease.<sup>3</sup> The prevalence of CKD is increasing and estimated to be 8–16% worldwide.<sup>4,5</sup> Treatment of CKD considering the stages of the

disease is various and the relationship between nutrition and kidney disease has a main effect on outcomes.<sup>6</sup> Using complementary medicine (CAM) in treatment of chronic disease is growing in the past 10 years in the U.S.<sup>7</sup> The management of CKD based on herbal traditional medicine is recommended as a preventive and therapeutic strategy<sup>8</sup> and medicinal plants with kidney protective activities is prescribed.<sup>9</sup>

Traditional Persian Medicine (TPM) is an ancient temperamental medicine with a history of over one thousand years. Temperament is made of a normal interaction between four basic elements, named hot, cold, wet, and dry elements. And dystemperament occurs when the whole body or an organ's temperament changes.<sup>10</sup> The kidney dystemperament occurs when the kidney temperament is changed and its function is disturbed. These conditions can lead to “Hozal-e-Kolye” (HK). HK in TPM occurs when the kidney becomes thin means its fat gets low or eliminates.<sup>11–14</sup> This study aimed to explain HK (the same tubular atrophy

\* Corresponding author. Fax: +98 5138535980.

E-mail addresses: [Mahjourmm2@mums.ac.ir](mailto:Mahjourmm2@mums.ac.ir) (M. Mahjour), [Khooshabia1@gmail.com](mailto:Khooshabia1@gmail.com) (A. Khoushabi), [mirighm@mums.ac.ir](mailto:mirighm@mums.ac.ir) (M. Miri Ghale Novi), [Feyzabadiz@mums.ac.ir](mailto:Feyzabadiz@mums.ac.ir) (Z. Feyzabadi).

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<sup>e</sup> Fax: +98 5138535980.<sup>f</sup> Fax: +98 5132171114.<sup>g</sup> Fax: +98 5132291963.

considering their similar symptoms) and introduce some foodstuffs as a complementary food management based on TPM.

## 2. Materials & methods

This is a review study by searching of the most important clinical and pharmaceutical TPM textbooks (That is not derived from the other books) such as *The Canon of Medicine* by “Avicenna” (10th and 11th centuries), *Exir-e-Azam* by Chishti (19th century), *Tuhfat Al-momenin* by Tonkaboni (17th century) and *Makhzan-Al-advie* by Aqili (18th century), with the keyword of “Hozal-e-Kolye” (the same tubular atrophy). Then, all of the foodstuffs extracted from this study were searched to find the related activity concerning the kidney function improvement by searching in scientific data banks such as Medline with these keywords: renal atrophy, tubular atrophy, kidney, chronic kidney disease, end stage renal disease. Finally, the results were inserted into a table.

## 3. Results

### 3.1. CKD in conventional medicine

CKD occurs when the impaired kidney function persists for three months or more. In this disorder, there is a decrease kidney function based on the presence of kidney damage. Glomerular filtration rate (GFR) has a central role in the pathophysiology of CKD complications. There are five stages in CKD classification on the basis of GFR: stage1 (more than 90 ml/min/1.73 m<sup>2</sup>), stage2 (60–89 ml/min/1.73 m<sup>2</sup>), stage3 (30–59 ml/min/1.73 m<sup>2</sup>), stage4 (15–29 ml/min/1.73 m<sup>2</sup>), stage5 (less than 15 ml/min/1.73 m<sup>2</sup>). Proteinuria has an important role in the pathogenesis CKD progression. When GFR is less than 15 ml/min/1.73 m<sup>2</sup>, kidney failure occurs and it needs dialysis or transplantation for treatment.<sup>15</sup>

Manifestations of CKD include: fluid and electrolyte imbalance (impaired ability to excrete leading to sensitive hypertension and edema due to reduce GFR), acid base abnormalities, carbohydrate intolerance, calcium and phosphate abnormalities and metabolic bone disease, hematologic abnormalities, gastrointestinal abnormalities, dermatological abnormalities, neuromuscular abnormalities. These patients are at risk of cardiovascular diseases.<sup>16</sup> Also, there is a nocturnal polyuria in renal insufficiency that is a precocious symptom in CKD.<sup>17</sup>

### 3.2. Phosphorus and tubular defect

The main homeostasis of phosphorus occurs in the kidney and the small intestine. A large part of phosphate from eating is excreted in the urine. There is a hypophosphatemia in the renal tubular defect.<sup>18</sup> 80% of the phosphorus reabsorption occur in the proximal tubule of the kidney, but in a tubular defect such as tubular atrophy this process doesn't occur so in this condition there is a hypophosphatemia and phosphaturia.<sup>19</sup> The urine color is white because of phosphaturia.<sup>20</sup>

### 3.3. Renal atrophy in conventional medicine

#### 3.3.1. Renal atrophy

Renal atrophy caused by many diseases such as acute or chronic pyelonephritis and obstruction of the urinary tract, the systemic atherosclerosis, metabolic syndrome, sickle cell disease,<sup>21</sup> atherosclerotic renal artery stenosis,<sup>22</sup> after hereditary renal cell carcinoma surgery,<sup>23</sup> xanthogranulomatous pyelonephritis (Cortical renal atrophy),<sup>24</sup> posttraumatic (injury).<sup>25</sup> Etiology of unilateral renal atrophy includes hydronephrosis, tumor, tuberculosis, Calculouse, chronic pyelonephritis,<sup>26,27</sup> congenital hypoplastic kidney,

renal infarction, radiation, renal artery stenosis,<sup>26</sup> partial nephrectomy.<sup>23</sup> The classic signs of renal atrophy in modern medicine include high blood pressure, low calcium, acidosis, anorexia, malnutrition (serious deficiency minerals and vitamins),<sup>28</sup> elevations in the serum creatinine concentration.<sup>29</sup> Acute kidney injury (AKI) can lead to renal atrophy by incomplete tubular repair, tubulointerstitial inflammation, and interstitial fibrosis.<sup>30</sup> Insufficient blood flow of kidney, can result in the renal atrophy too.<sup>31</sup>

#### 3.3.2. Renal tubular disorder

Renal tubules are very important in the body homeostasis. The proximal tubules play a main role in the transport of phosphate, glucose, amino acid, bicarbonate and sodium. The dysfunctions of these tubules are primary or secondary. When these tubules are injured, some disorders occur, such as hypophosphatemia, and aminoaciduria. Common symptoms of most renal tubulopathies include polyuria and also growth failure and resistant rickets (in children). If tubular dysfunction occurs, phosphaturia will be present.<sup>32</sup> Phosphaturia cause white urine.<sup>20</sup> (Table 1).

#### 3.3.3. Etiologies of tubular atrophy

After allografts, persistent glomerulonephritis and proteinuria, antiglomerular basement membrane disease, medullary cystic kidney disease type I (a mutation in the mucin 1 gene), chronic tubulointerstitial diseases, allergic interstitial nephritis, granulomatous interstitial nephritis, vesicoureteral reflux and reflux nephropathy, lithium salts, the calcineurin inhibitor (CNI) immunosuppressive agent's cyclosporine and tacrolimus, prolonged and severe hypokalemic nephropathy, diphtheria toxin.<sup>33</sup>

### 3.4. HK in Traditional Persian Medicine

TPM scholars believed that any organ of the body has a typical temperament. In an ideal healthy state, the individual function is very good and dystemperament occurs when the whole body or an organ's temperament changes. In other words, it grows up in the imbalance of the quality or quantity of humors including phlegm, bile, blood and black bile.<sup>13</sup> The kidney dystemperament occurs when the kidney temperament is changed and its function is disturbed. This kidney dystemperament can lead to “Hozal-e-Kolye” (HK). HK in TPM occurs when the kidney becomes thin (its fat gets low or eliminates), hot or cold.<sup>13,14</sup> In high kidney temperature, the kidney fat is lost because of the warmness and in low kidney temperature, the kidney equalizer is disturbed. TPM scholars believed that HK occurred by several reasons such as dystemperament of the kidney, evacuation (in TPM, evacuation means excretion of many fluids from the body, such as excessive hemorrhage, diarrhea, severe vomiting, expelling excess semen and excess usage of purgative or diuretic drugs resulting severe dehydration). Symptoms of HK include white urine, polyuria, weight loss, permanent low back pain and low libido.<sup>11–14</sup> (Table 1). Some

**Table 1**

Comparing symptoms of HK and tubular atrophy.

Symptoms of tubular disorders in conventional medicine	Ref	Symptoms of HK in TPM	Ref
Polyuria	17	Polyuria	11–14
White urine (because of phosphaturia)	20 32	White urine	
Growth failure	32	Weight loss	
Resistant rickets		Permanent low Back pain	
Hypophosphatemia in the laboratory test	18	Low libido	
		There was not laboratory test at Avicenna's time	

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