

Dietary Recommendations for Urinary Stones, From the Perspective of Persian Medicine and Comparison with Current Management

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ABSTRACT

Urinary stone is a common health disorder worldwide. Although there are various pharmacological and surgical therapies for urinary stones, it is still a common emergency complaint that can impose a financial burden on society. Therefore, seeking proper approaches to prevent and reduce the recurrence of urolithiasis is necessary.

Urinary stone has been described in Persian medicine (PM) that widely practiced and accepted. Based on the main PM manuscripts, the present study focuses on the concept of urinary stone as an important systemic disorder in order the development of urinary stones management. Accordingly, lifestyle modification is one of the main approaches to the control and treatment of urinary stones in PM.

This review discusses the etiology of urinary stones and the control and treatment of urinary stones by lifestyle modification, diet, and foodstuffs according to the theory and practice of PM, which can be considered as useful complementary recommendations for controlling urinary stones. Some of these recommendations are approved by numerous studies, and some others should be investigated in further studies.

KEYWORDS

Urinary Stone, Urolithiasis, Diet, Persian Medicine (PM), Iranian Traditional Medicine (ITM).

Introduction

Urinary stone is a worldwide problem, which can significantly affect the quality of life. It not only causes personal suffering, such as more stress, depression, and pain but also imposes a significant financial burden on work and family life (1). The lifetime risk of urolithiasis is about 10%-15% in developed and 20%-25% in West Asia countries (2). It has a high recurrence rate of about 50% at 5-10 years (2). Many conditions, such as family history, metabolic disorders, anatomical defects in the urinary tract, and chronic urinary tract infections, can cause urolithiasis; however, most of the time, the pathogenesis is unknown (3).

Urinary stone should be considered as a systemic disease correlated with or predictive of hypertension and cardiovascular damage, insulin resistance, chronic kidney and metabolic bone diseases (3-5). It is found that for treatment of urinary stones, a systemic approach should be taken, and treatment should not only limited to urinary system (5). Although there are various pharmacological and surgical therapies for kidney stones, urinary stones are still a common emergency complaint; the recurrence rate is highly reported, imposing a financial burden on society (4,6). Therefore, seeking proper approaches to prevent and reduce the recurrence of urolithiasis is necessary.

Nutrition is one of the major risk factors for urinary stone formation, as urine composition is strongly associated with diet components (7). Dietary and lifestyle modification can act as a cheap, safe, and effective strategy to reduce the risk factors for kidney stone formation and prevent recurrence (5).

Iranian traditional medicine (ITM), or Persian medicine (PM), consists of valuable knowledge of the prevention and treatment of diseases in Iran from ancient times. ITM scholars paid attention to various diseases, such as kidney and bladder stones, and treated them with a holistic view. ITM physicians believed that prevention is superior to treatment and dietary compliance is the first step in prevention (8). ITM scholars' viewpoint on urinary stones, especially dietary recommendations, can be useful in the prevention and treatment of this condition.

Considering the importance of nutrition in the control of urinary stones and increased tendency toward the use of traditional medicine in recent decades, the present study aimed at appraising the effectiveness of ITM nutritional recommendations in the management of urinary stones, and comparing them with those of conventional medicine (CM).

Method and Material

In this review, the major manuscripts of Persian Medicine and the Conventional Medicine sources were investigated. The references of PM were included *al-Havi*, written by *Abubakr Muhammad ibn Zakariyya al-Razi (Razes)* (9th A.D), *Kamel al-Sanaat al Tibbiah*, written by *Ali ibn Abbas Majusi Ahwazi* (Haly Abbas) (10th A.D), *Canon of Medicine*, written by *Avicenna (Ibn-e-Sīnā)* (11th A.D), *Kholasato-Al-Hekmah* from *Mohammad Hossein Aghili Khorasani* (18th A.D) and *Eksir Azam* from *Mohammad Azam Khan-e Chashti* (19th A.D). Also, we assessed databases such as Scopus, Google scholar and Pubmed to evaluate relationship between PM and current medicine knowledge about dietary recommendation in urinary stones.

Results

There were various nutritional recommendations in both CM and PM to control the incidence and recurrence of kidney stones.

ITM or PM, is also known as humoral medicine. The humoral theory relies on a belief that the body is composed of four humors (i e, blood, phlegm, yellow bile, and black bile). Every humor is a substance made from digestion and transmutation of foodstuffs in the digestive system (9,10). In PM, temperament (Mizaj) is a unique feature of an individual, distinguished by his morphological, physiological, and psychological characteristics, and is a combination of humor qualities in the body (11). According to the principles of PM, an individual is in a state of health if his Mizaj is balanced, and illness if the balance in his mizaj is disturbed (i e, dystemperament (su-e-mizaj)(11).

According to the PM theories, urinary stone (*hosat*) is “a kind of systemic disorder which can be related to digestive system”. Persian medical practitioners believed that two main risk factors are involved in the pathogenesis of urinary stones, including: 1) excessively hot temperament (*hot mizaj*), especially in kidneys, and 2) phlegm dystemperment, which results from the accumulation of substances that are not easy digestible (12,13). In PM, there is a belief that the consumption of foodstuffs which are difficult to digest (Heavy foods that are also known as “*ghaliz*” foods), can produce a type of humor (thick and viscous humor) which is involved in the formation of urinary stones. So, one of the main PM recommendations for the prevention and treatment of urinary stones is to avoid eating *ghaliz foods* (12,13). In PM resources, foods are divided into three groups, based on digestion time: concentrated foods (*ghaliz food*) with longer, soft foods (*latif food*) with shorter, and foods with medium digestion times (8).

In PM, there are recommendations for some of the food groups, such as dairy, bread, vegetables, and fruits, for patients susceptible to kidney stones and emphasized dyspepsia improvement. These recommendations, consisting of foodstuff and eating habits, destruct concentrated and viscous substances (phlegm dystemperment), subsequently leading to a decrease in stone-forming substances in the body (Table 1) (6,11–17).

PM dietary recommendations for the management of urinary stones are summarized in Table 1.

Table 1. PM dietary recommendations for prevention of urinary stones

Recommended items included		
Improve eating habits	Dietary abstinence (<i>Ghaliz food</i>)	Dietary recommendations (Foods that are easy to digest and absorb)
1) Food should be eaten in balanced, neither too much nor too little 2) Avoid eating different foods in one meal, but in different meals, have a variety of foods 3) Improve digestion and strengthen the patient's stomach to have well digestion (11,14–16) 4) Chewing well and gentle(8,16) 5) Doing exercise adequately to individual physical condition, preferably before meals and avoid exercise and strenuous physical activity after eating.(12,14,15,17) 6) Avoid of constipation. (Defecation should be easily) (13,15)	1) Animal milk, especially concentrated milk and fresh cheese (12,13,17) 2) Fried foods 3) Hard-boiled egg (13,15,17) 4) Thick meats such as meat of: camel, beef, male goat, game(10,13,14,17) 5) unclear water, especially water that is not normally used for drinking (12–15,17) 6) Bread which is not well baked, bread made from unfermented dough, bread without bran(10,13,14) 7) All kind of food prepared with flour and starch 8) Any food made with noodles and pasta 9) <i>Halim</i> (A mashed that made of wheat and meat) (12–14,17) 10) <i>Shirberenj</i> (A soup that made of cooked rice in milk(10,13,14,17) 11) Some fruits which need long time for digestion such as: raw and unripe apples, peaches especially unripe peaches, pear and bergamot (6,10,13–15)	1) Cooked chickpea (12–14) 2) Any soft meats such as partridge, quail, chicken, kid goat, lamb and small fishes (12–14) 3) Meatless pottage with or without sweet almond oil(6,10,13,14) 4) Any easy digestion meat such as partridge, quail, chicken, kid goat, lamb and small fishes 5) Fruits such as grapes, figs, hawthorn, melons, cucumbers, pistachio 6) Herb and vegetables such as chicory, celery, pennyroyal, dill, fennel and squash(6,10,13,14)

Discussion

The present review discusses the etiology of urinary stones and the control and treatment of urinary stones by lifestyle modification, diet, and foodstuffs according to the theory and practice of PM. Persian physicians were aware of the multiple forms of urinary stones and relied on an organized system of etiological theories and treatments. Urinary stone was treated by three main approaches in PM: diet and exercise, simple single herbal medicines, and compound preparations.

In Conventional medicine (CM), the mechanism of urinary stone formation is not fully understood, and several factors, such as genetics, diet, and sedentary lifestyle, contribute to its occurrence (18,19). Diet and nutritional habits are major lithogenic risk factors that can be responsible for increasing the incidence of urinary stones in recent years (18).

In CM, few known nutritional factors contribute to the formation of urinary stones, including insufficient intake of fluid, calcium, fruits, and vegetables, as well as excessive intake of animal protein and salt (Table 2) (20,21).

Table 2. Conventional medicine dietary recommendations for prevention of urinary stones

Fluid	Fluid intake of 2500 ml per day or more
Animal protein	0.8 grams per kilogram of body weight per day
Sodium	limit sodium intake to less than 2400 mg (less than 5 grams of salt) per day
Calcium	consume 1000 to 1200 mg of calcium daily from dairy source

Oxalate	reduce the consumption of foods high in oxalate such as cocoa, rhubarb, beets, spinach, etc
Citrate	Increase intake of vegetables and fruits

In CM, an increase in the consumption of water and fluids to above 2500 mL daily plays a significant role in preventing urinary stone formation by reducing the saturation of stone constituents (22,23). It is in accordance with PM principles since water has a cold temperament that can decrease the hot quality and modify the balance of body temperament and humors; however, according to PM, wrong time of drinking water, such as during or immediately before and after meals, may disturb food digestion and increase ghaliz humor; therefore, liquid consumption should be limited to 20 minutes before and two hours after meals (8,24). Also in PM, cloudy and unclear water, especially those not usually used for drinking, is prohibited for patients with kidney stones (6,12–15).

Current approaches to the management of urinary stone disorders suggest increasing the consumption of fruits and vegetables for reducing the risk of stone formation by increasing citrate secretion (23).

Extensive epidemiological studies failed to differentiate oxalate intake patterns between those with and without kidney stones (23). However, it is recommended for patients with hyperoxaluria to decrease the consumption of foods high in oxalate, such as cocoa, rhubarb, beets, spinach, etc. (23).

Comparison of PM and CM in this regard indicated that in CM, consumption of fruits and vegetables, except those high in oxalate, prevents urinary stone formation in patients with hyperoxaluria; however, in PM, the consumption of some fruits requiring long time for digestion, such as raw and unripe apples, shaftalo (a kind of peach), unripe peaches, pear, and bergamot, are harmful in urolithiasis (Table 1).

Fruits and vegetables that are recommended in PM are shown in Table 1. The anti-lithiasis activity of some of these plants, such as chicory, celery, melon, grape, and chickpea, is reported in different studies (25–29). It is recommended that further studies be performed to investigate the effects of fruits and vegetables that are considered harmful substances for urinary stones in traditional Persian manuscripts.

In CM, due to the binding of dietary calcium to oxalate in the intestines, inhibition of oxalate absorption, and reduction of urinary excretion, it is recommended that patients with urinary stones consume 1000 to 1200 mg calcium per day from dairy sources (21). There is a controversy between CM and PM in this regard. In CM, low dietary calcium is a risk factor for urinary stones, and it is recommended to consume 1000-1200 mg of calcium daily from dairy sources, such as milk, cheese, and yogurt (20); however, in PM manuscripts, consumption of these substances are prohibited for patients with urinary stones (12–15). Therefore, more studies in this field are required to achieve more conclusive results.

Diets which has high animal protein, by increasing uric acid, decrease urinary pH, and increase urinary calcium, which, in turn, increase the risk of calcium stone formation (7,30). Numerous cohort and meta-analysis studies indicated the adverse effects of red meat consumption on cardiovascular disease, type 2 diabetes, and nephrolithiasis (30–33).

Therefore, the limitation of animal protein intake to 0.8 g/kg of body weight daily is recommended in CM (21,22).

A few studies showed differences between red and white meat, such as hemoglobin levels, but the difference between various red meat is not studied thus far (30–33).

Since diabetes and metabolic syndrome are risk factors for kidney stones (4), and higher levels of heme iron in red meats, compared to white ones, can be atherogenic and diabetogenic, it is suggested to eat white meat. This finding was consistent with PM principles believing in differences between various types of red meat, avoiding difficult digest red meat (thick meat) such as beef and camel, and recommending easy digest red meat, such as lamb, and white meat, such as quail and chicken (Table 1). Further studies in this regard are required to evaluate effects and relationships of different types of meat with urinary stones.

In CM, increasing the amount of sodium in food reduces urinary citrate and increases urinary calcium. Since urinary

citrate inhibits stone formation and urinary calcium stimulates stone formation, it is recommended that sodium intake be limited to less than 2400 mg (<5 g of salt) per day (21,22).

As already mentioned (Table 1), CM dietary recommendations are focused on nutrients, such as sodium, calcium, oxalate, and citrate. One problem with this approach is that people do not make meals and snacks according to the given pattern; calculation of sodium, fiber, and calcium amounts of prepared foods is also difficult. Therefore, there seems to be a shift from nutrient-based recommendations to foods consumed in the last decades. Emphasis on foods rather than nutrients simplifies recommendations for healthy eating, making them easier to understand and put into action (34–36).

Table 3 provides a brief comparison between the recommendations of PM and CM.

Table 3. Comparison between some of Persian Medicine and conventional medicine recommendations in nephrolithiasis

Dietary factors	Conventional medicine's viewpoint	Persian medicine's viewpoint	
		recommended	Avoidances
How to cook food	Eat less fatty foods	Boiled food	Fried food
Eating habits	There is not any recommendation	Chew food well	Eat fast, Use different foods and eating a variety of foods in one meal
Stomach digestive power	There is not any recommendation	Pay attention to strengthening the digestive power of the stomach	

Modern lifestyle, sedentary behavior, wrong eating habits, and obesity are the risk factors for kidney stone formation (37,38).

Turney et al., in a six-year prospective cohort study, showed that the rate of admission for kidney stones in individuals with a BMI above 27.5 kg/m² was twice more than that of those with a BMI of 20-22.5 kg/m² (39).

Researches showed that the urine of individuals with high BMI or with metabolic syndrome has higher levels of calcium, uric acid, and oxalate, and low pH and citrate; therefore, they are more prone to kidney stones (37,38).

In PM, obesity is due to the presence of excess phlegm in the body and imbalance of cold and wet quality, leading to the concentration of substances in the body. These conditions predispose the body to urinary stone formation. Therefore, there is a similar view of overweight and obesity in both CM and PM, and avoiding obesity is recommended (40,41).

Since modifying eating habits, such as eating slowly and strengthening the digestion, are important factors in reducing obesity and metabolic syndrome, it is suggested that the risk of urinary stones might be reduced by observing these issues (42,43). In a three-year prospective cohort study in Japan, a significant relationship was observed between eating fast and the incidence of metabolic syndrome; this relationship is confirmed in other studies in Japan (43).

It seems that due to the higher prevalence of nephrolithiasis in those with obesity, diabetes, and metabolic syndrome and the positive effects of eating habits modification on controlling the condition of such patients, more attention should be paid to diet and eating habits in controlling the incidence or recurrence of nephrolithiasis.

While CM recommendations are still inadequate for controlling urinary stones, and traditional approaches have found experimental support over the centuries, some of PM recommendations may still be useful for prevention and control of urinary stones. Furthermore, these dietary recommendations should be considered the most cost-effective option for the clinical management of urinary stones (18,19). Therefore, current investigations should focus on the

possible benefits of PM recommendations.

Conclusion

Results of the present study demonstrated various recommendations in PM, including diet and lifestyle modifications, for the management of urinary stones, which can be considered useful complementary recommendations for controlling urinary stones. Some of these recommendations are approved by numerous studies, and some others should be investigated in further studies.

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Conflicts of Interest

The authors state that they have no conflicts of interest.

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