

# Utilization of barley and parsley for the management of urolithiasis among the Saudi Arabian population

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## Abstract

**Objective:** To determine the utilization of barley and parsley for managing urolithiasis among the Saudi Arabian population.

**Methods:** This is a prospective cross-sectional survey-based study. The survey comprised questions about the use of barley, parsley, and other therapies for managing urolithiasis. A WhatsApp® message with the link to the study survey was sent out to family, friends, patients, and other acquaintances residing in the Kingdom of Saudi Arabia (KSA).

**Results:** A total of 1014 respondents completed the survey, of which 44.8% indicated that they utilized barley, 38.3% stated that they used parsley, and 4.2% indicated that they utilized other non-medical remedies to treat or prevent kidney stones. In contrast, only 29.5% stated that they utilized potassium citrate and/or magnesium citrate, and only 14.4% indicated that they consumed greater amounts of water to treat or prevent kidney stones.

**Conclusion:** Our study findings indicate that among the Saudi Arabian population, non-conventional therapies such as barley and parsley are more commonly utilized for managing urolithiasis rather than established therapies such as increasing water intake and the use of potassium-citrate/ magnesium-citrate. There is a need to conduct large-scale clinical studies to evaluate the efficacy and safety of barley, parsley, and other non-conventional therapies for treating urolithiasis.

**Keywords:** Barley, herbal remedies, kidney stones, nephrolithiasis, parsley, potassium-magnesium-citrate, renal stones, urolithiasis

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## INTRODUCTION

The lifetime risk of renal stone disease (urolithiasis) is as high as 10%–15%, with a recurrence rate of up to 50% within 10 years.<sup>[1]</sup> The Saudi Arabian population has a 2.5-fold higher risk of developing urolithiasis, the causes

of which are multifactorial and includes environmental, nutritional, and genetic factors.<sup>[2]</sup> These high rates may also reflect inadequate knowledge of proven measures that have been shown to reduce renal tract stone formation.

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**Table 1: Responses of respondents regarding the use of barley, parsley, potassium-magnesium-citrate, water, and other nonmedical remedies for the treatment or prevention of kidney stones**

Total	n=1014, n (%)
Have you ever used barley for treating or preventing kidney stones? (Yes)	454 (44.8)
Have you ever used parsley for treating or preventing kidney stones? (Yes)	393 (38.3)
Have you ever used potassium citrate and magnesium citrate (available at local pharmacies and other shops) to treat or prevent kidney stones? (Yes)	299 (29.5)
Have you ever consumed significant amounts of water to treat or prevent kidney stones? (Yes)	146 (14.4)
Have you ever used other nonmedical remedies to treat or prevent kidney stones? (Yes)	43 (4.2)

Dietary modification and lifestyle changes play a significant role in managing and preventing urolithiasis,<sup>[3]</sup> with remission rates reaching up to 90% in patients compliant with dietary modification and medical therapy.<sup>[4]</sup> General recommendations for all renal stone formers include adequate hydration, lower protein intake, and increased vegetable consumption.<sup>[5]</sup> However, a study in Saudi Arabia reported that urologists possess suboptimal knowledge regarding urolithiasis preventive measurements and infrequently apply these guidelines in their daily practice.<sup>[6]</sup>

The general population of Saudi Arabia has a widespread belief in using nonconventional remedies to manage urolithiasis.<sup>[7]</sup> Among these, barley and parsley are foods widely available in Saudi Arabia and may be helpful in managing urolithiasis.<sup>[8-11]</sup> Hence, this study aimed to determine the utilization of barley and parsley for managing urolithiasis among the Saudi Arabian population.

## METHODS

This prospective cross-sectional survey-based study was conducted in the Kingdom of Saudi Arabia (KSA). The study was approved by the Research Ethics Committee of the University of the Hail (clearance certificate no. H-2022-031).

Data were collected from March 01, 2022, to July 31, 2022. The study investigators initially sent out a WhatsApp® message with the link to the study survey to family, friends, patients, and other acquaintances residing in the KSA. The message included a request to complete the study survey and forward the message with the link to others on their contact list.

On clicking the link, potential participants were directed to the study information and informed consent page. Participants were assured that all responses were anonymous and confidential and that no identifying

information would be collected. Those consenting to study participation were then directed to the electronic survey. The survey was in Arabic and English and comprised seven questions: (1) Do you live in Saudi Arabia? (2) Have you ever been diagnosed with kidney stones? (3) Have you ever used barley for treating or preventing kidney stones? (4) Have you ever used parsley for treating or preventing kidney stones? (5) Have you ever used potassium and magnesium citrate (generally available at local pharmacies and shops) to treat or prevent kidney stones? (6) Have you ever consumed significant amounts of water to treat or prevent kidney stones? and (7) Have you ever used other nonmedical remedies to treat or prevent kidney stones? Only participants who answered “yes” to the first and second questions could access the remaining five questions.

The collected data were entered into Microsoft Excel® (Microsoft 365, Version 2107, Microsoft Corporation, Redmond, Washington, United States) for analysis. Variables were described and tabulated through frequency and percentage.

## RESULTS

A total of 1014 respondents completed the survey. Of these, 454 (44.8%) indicated that they utilized barley, 393 (38.3%) stated that they used parsley, and 43 (4.2%) indicated that they utilized other nonmedical remedies to treat or prevent kidney stones. In contrast, only 299 (29.5%) respondents stated that they used potassium citrate and/or magnesium citrate, and only 146 (14.4%) indicated that they consumed greater amounts of water to treat or prevent kidney stones. The summary of results are in Table 1.

## DISCUSSION

When comparing recent data to data from the 1990s, there has been a 70% increase in the incidence of urolithiasis, with a 30%–50% increase in the 5-year recurrence rate.<sup>[12]</sup> Compared to North America, which has a 13% prevalence of renal stones, the majority is much higher in Saudi Arabia, with reported rates of approximately 20%.<sup>[13]</sup>

In keeping with international trends, renal stones among the Saudi Arabian population are predominantly of the calcium oxalate type, followed by uric acid stones.<sup>[2,14-17]</sup> Preventative measures are of the uttermost importance and could potentially reduce the recurrence rate by up to 90%.<sup>[4]</sup> Hence, it is concerning that urologists in Saudi Arabia possess suboptimal knowledge about urolithiasis preventive measurements.<sup>[6]</sup> Metabolic evaluation and metaphylaxis decrease the recurrence rate of renal stones and are cost-effective measures.<sup>[18]</sup> General dietary

recommendations for preventing urolithiasis include good hydration, low sodium intake, and low protein consumption.<sup>[4,19]</sup>

There has always been an interest in the use of nonconventional therapies for the management of urolithiasis.<sup>[20]</sup> Nonconventional treatments are not uncommon, even in developed countries like the United States of America. A survey showed that one in three respondents admitted to using at least one nonconventional remedy.<sup>[21]</sup> Nonetheless, the scientific evidence supporting the use of these therapies for the management of urolithiasis is sparse, with most studies being limited to *in vitro* studies, animal studies, or studies with only a small number of patients.<sup>[22]</sup> Anecdotally, it has been noted that the Saudi Arabian population also tends to utilize nonconventional therapies for managing urolithiasis, with barley and parsley seemingly being the most commonly used products.

In our study, 44.8% of respondents indicated using barley (*Hordeum vulgare*) to treat or prevent kidney stones. In addition to promoting stone clearance by encouraging diuresis and increasing urinary pH, barley also has high contents of Vitamin B6 and magnesium, both of which promote the breaking down of calcium oxalate in the renal tract. Furthermore, barley's high dietary fiber content also helps reduce renal calcium excretion. Barely consumed in the form of barley grain kernels boiled in water.<sup>[9]</sup>

The use of barley for managing renal stones has been studied in *in vitro* and animal models. While the *in vitro*-based study showed that oxalate oxidase, which is a constituent of barley, was not very successful in dissolving calcium oxalate monohydrate, calcium phosphate (brushite), or magnesium ammonium phosphate (struvite),<sup>[23]</sup> a study conducted in rats reported that barley was associated with an increase in urine output and urinary citrate concentration and a decrease in the concentration of urinary calcium, phosphate, uric acid, and oxalate.<sup>[24]</sup>

In our study, 38.3% of respondents indicated using parsley to treat or prevent urolithiasis. Studies on rat models showed that parsley reduces urinary calcium oxalate deposition by increasing diuresis and pH and decreasing urinary calcium and protein excretion.<sup>[10,11]</sup> Similar to barley, there are no human trials to prove its efficacy. Alyami and Rabah compared 20 subjects who were assigned to consume 1200 mL of parsley leaf tea or bottled water for 2 weeks. They did not find any change in the urinary concentration of citric acid, uric acid, magnesium, sodium, potassium, cystine chloride, urea, creatinine, or phosphorus,

nor were there any changes in the urinary volume or urinary pH between the two groups. The authors concluded that further research was required to evaluate the effects of parsley in managing urolithiasis.<sup>[7]</sup>

Using potassium and magnesium citrate<sup>[19]</sup> and increasing oral water intake<sup>[4,25]</sup> have been well-described for managing urolithiasis. However, compared to barley and parsley, only 29.5% and 14.4% of respondents indicated using these measures to treat or prevent kidney stones. More respondents may have utilized potassium-citrate and/or magnesium citrate and would have recognized these agents by their trade names but were unaware of the pharmacological names.

Besides the limited data regarding the efficacy of barley, parsley, and other nonconventional remedies for urolithiasis, the lack of standard methods of preparation and dosage to be used raises questions regarding their safety. Hence, we recommend that clinicians and public health programs instead encourage using established therapies for managing urolithiasis. To manage urolithiasis, there is also a need to conduct large-scale clinical studies to evaluate the efficacy and safety of barley, parsley, and other nonconventional treatments.

The use of herbal remedies and alternative medicine is a popular trend across the globe. Numerous studies and reviews have been conducted to assess their effectiveness and safety. Some plants, such as *Phyllanthus niruri* L. and *Elymus repens* (L.) Gould and herbal products like “Wu-Ling-San” formula, “Cystone,” and “Herbmed” have shown promising results as antiurolithiatic medicines during clinical trials.<sup>[26]</sup> Unfortunately, there is limited high-quality evidence on stone disease, and recommendations based on folklore or poor-quality studies are common. However, the reviewed natural treatments suggest a balanced diet rich in high-alkali fruits and vegetables protects against initial and recurrent stone formation.<sup>[27]</sup>

A limitation of our study is the relatively small sample size concerning the population of Saudi Arabia. In addition, methods of preparation, quantity, and frequency of use of the nonconventional therapies utilized were not explored.

## CONCLUSION

Our study findings indicate that among the Saudi Arabian population, nonconventional therapies such as barley and parsley are more commonly utilized for managing urolithiasis rather than established treatments such as increasing water intake and using potassium citrate/

magnesium citrate. There is a need to conduct large-scale clinical studies to evaluate the efficacy and safety of barley, parsley, and other non-conventional therapies for treating urolithiasis.

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### Conflicts of interest

There are no conflicts of interest.

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