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Renal stones: An updated review about natural remedies

Abdullah Abdulrahman Al-Shuwayman
KSA, National Guard Health Affairs

Abdullah lbrahim Alsulaiman
KSA, National Guard Health Affairs

Khalid Ali Almzairie
KSA, National Guard Health Affairs

Hamad Fahad Hamad Aldawsari
KSA, National Guard Health Affairs

Abdulrahman Saud Alhelayil
KSA, National Guard Health Affairs

Abdul Rahman Haif Aljish
KSA, National Guard Health Affairs

Mohammed Ibrahim Suliman Albabtain
KSA, National Guard Health Affairs

Azzam Abdullah Rashed Al Nemer
KSA, National Guard Health Affairs

Shahad Mohammed Bin Saeed
KSA, National Guard Health Affairs

Osamah Musa Almutairi
KSA, National Guard Health Affairs

Muhammad Sultan Al-Harkan
KSA, National Guard Health Affairs

***Abstract*---Background:** Urolithiasis is a prevalent global health issue characterized by the formation of kidney stones, significantly impacting patient quality of life and healthcare costs. The increasing incidence of kidney stones, particularly among individuals over 30,

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***Corresponding author**: akk29337@gmail.com*
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places a considerable financial burden on healthcare systems, with estimates reaching USD 5.3 billion in 2014. **Aim:** This review aims to provide a comprehensive overview of the latest natural remedies for managing renal stones, discussing their efficacy and integration into existing treatment paradigms. **Methods:** A thorough literature review was conducted, focusing on recent studies and clinical guidelines from organizations like the American Urology Association (AUA) and the European Association of Urology (EAU). The effectiveness of various natural remedies was analyzed alongside conventional treatment options. **Results:** The review identifies several natural remedies that may complement traditional therapies for renal stones. These include dietary modifications, hydration strategies, and herbal supplements that demonstrate potential benefits in stone prevention and management. **Conclusion:** While conventional medical treatments remain the cornerstone of urolithiasis management, natural remedies may offer valuable adjunctive options. Further research is warranted to establish standardized protocols for integrating these remedies into clinical practice.

***Keywords*---**urolithiasis, renal stones, natural remedies, treatment, kidney stones, healthcare burden.

Introduction

Urolithiasis is a highly prevalent condition worldwide, though its occurrence varies significantly due to factors such as gender, climate, diet, and other risk factors. Notably, there has been an annual increase in the prevalence of kidney stones among individuals over 30 years of age, regardless of gender [1]. This growing incidence, coupled with advancements in technology, imposes a substantial financial burden on healthcare systems for managing kidney stone disease (KSD), with global expenditures on the condition estimated at USD 5.3 billion in 2014, making it the second most expensive urological disorder [2]. Numerous comprehensive guidelines on urolithiasis have been developed by esteemed organizations worldwide. Among these, the guidelines issued by the American Urology Association (AUA) and the European Association of Urology (EAU) are widely recognized and utilized by healthcare professionals globally for the diagnosis, management, and follow-up of KSD patients. The AUA has separate guidelines addressing both medical and surgical management of KSD, with the most recent updates occurring in 2019 and 2016, respectively [3,4]. In contrast, the EAU publishes a singular document titled *Urolithiasis*, which provides management strategies for urinary tract stones, with its latest update in 2023 [5].

Both guidelines employ distinct methods to evaluate the strength of evidence presented. The AUA guidelines utilize a grading system that includes letters A, B, and C to reflect the quality and certainty of the evidence [6], incorporating different nomenclature for medical versus surgical guidelines. Specifically, surgical guidelines use terms indicating strong, moderate, or conditional recommendations, while medical guidelines employ language that denotes options, recommendations, and standards based on the risk–benefit analysis for

patients. In situations where evidence is insufficient, clinical principles and expert opinions are utilized to offer additional insights. In contrast, the EAU categorizes its recommendations as "strong" or "weak," following the GRADE methodology [7], which considers factors such as evidence quality, effect size, certainty, balanced outcomes, and patient preferences [8]. Furthermore, the EAU guidelines delineate objectives for the 2024 update, focusing on enhancing evidence evaluation for effective endourology practices and scrutinizing the role of stone size in determining treatment options. Although guidelines offer crucial information and clinical frameworks by synthesizing the best available evidence, they cannot ensure optimal patient outcomes due to limitations in their updates [8]. Therefore, when developing a treatment plan, clinicians must prioritize their expertise and the individual circumstances of each patient, ensuring that guidelines serve as a supportive tool rather than a directive that overrides clinical judgment.

Presentation and Evaluation

Urolithiasis can manifest through various symptoms, including fever, vomiting, loin pain, or may even be entirely asymptomatic. In cases of bladder stones, patients may present with recurrent urinary tract infections (UTIs), increased urinary frequency, terminal hematuria, or suprapubic discomfort. A comprehensive medical history and physical examination are essential during the initial assessment. The European Association of Urology (EAU) advises that investigations should be expedited if there is uncertainty regarding the diagnosis, the presence of fever, or if the patient has a solitary kidney (strong recommendation). However, it is important to ensure that imaging does not delay the provision of effective analgesia and resuscitation.

Renal and Ureteric Stones

The EAU recommends ultrasound (US) as the initial investigation for asymptomatic patients, given its safety, cost-effectiveness, and ability to detect hydronephrosis and calculi in the renal calyces, pelvis, and at the pelvic-ureteric and vesico-ureteric junctions. For symptomatic patients, non-contrast-enhanced computed tomography (NCCT) is preferred, as it allows for the classification of stone density, diameter, volume, proximity to the skin, and surrounding anatomy, which aids in determining treatment options (EAU: strong recommendation). NCCT is significantly more accurate than US or intravenous urogram (IVU) for diagnosing urolithiasis [9]. If anatomical assessment of the collecting system is necessary prior to stone removal, contrast-enhanced imaging should be performed (EAU: strong recommendation). Although kidney ureter bladder (KUB) X-rays can identify the radiopacity of stones, the EAU states they are unnecessary if NCCT is planned. The American Urology Association (AUA) similarly endorses NCCT as the preferred imaging modality for assessing patients with urolithiasis before percutaneous nephrolithotomy (PCNL) (AUA: strong recommendation). It is also recommended for treatment selection between shock wave lithotripsy (SWL) and ureteroscopy (URS) (AUA: conditional recommendation), while discouraging the sole use of US for this purpose. If significant renal injury is suspected, functional imaging techniques such as a diethylene-triamine-penta-acetate (DTPA) or mercaptoacetyltriglycine (MAG-3) renogram may be employed to assist in treatment planning (AUA: conditional recommendation). In addition to imaging,

various laboratory tests, including hematology, serum biochemistry, and coagulation assessments, should be conducted. The EAU recommends measuring serum creatinine, uric acid, ionized calcium, sodium, potassium, blood cell counts, C-reactive protein, and conducting coagulation tests if an intervention is anticipated (EAU: strong recommendation). Both the EAU and AUA strongly recommend performing urine culture and microscopy prior to any intervention.

Bladder Stones

For symptomatic patients suspected of having bladder stones, US should be the initial imaging technique employed. If symptoms persist and US results are inconclusive, NCCT or cystoscopy should be considered, given their higher sensitivity for diagnosis compared to US [10] (EAU: strong recommendation). While X-ray KUB can provide useful insights into radiopacity, its accuracy for stone detection is low [11]; therefore, its use in treatment planning and follow-up is only weakly recommended (EAU: weak recommendation). Due to a lack of substantial evidence, there are no specific guidelines for imaging modalities in children with suspected bladder stones. Additionally, the AUA does not provide guidelines regarding the diagnosis of bladder stones.

Medical Treatment

Several medications are utilized as medical expulsive therapy (MET) for urolithiasis, including α-blockers, calcium channel inhibitors, and phosphodiesterase type 5 (PDE5) inhibitors. Although α-blockers are used off-label, numerous meta-analyses support their efficacy as MET. The EAU recommends considering α-blockers for distal ureteral stones larger than 5 mm (strong recommendation), while the AUA recommends offering them for stones 10 mm or smaller (strong recommendation).

Oral Chemolysis

Oral chemolitholysis, which involves the alkalinization of urine using alkaline citrate or sodium bicarbonate, is used to dissolve uric acid stones. Despite its long-standing use, there are no randomized controlled trials (RCTs) to support its efficacy. Potassium citrate is advised for alkalinizing urine in patients with uric acid and cystine stones; however, the outcomes regarding stone dissolution are inconsistent (AUA: expert opinion). Patients undergoing this treatment should be monitored and educated on checking urinary pH, with adjustments made to the drug dosage as necessary (EAU: strong recommendation).

Extracorporeal Shock Wave Lithotripsy (ESWL)

Although ESWL has a lower stone-free rate (SFR), it is associated with fewer complications compared to other endourology procedures such as ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) [12,13]. Factors influencing the effectiveness of ESWL include the patient’s body habitus, stone size, location, composition, and the procedure's execution. To optimize results, an appropriate coupling agent, such as ultrasound gel, should be utilized to prevent shock wave deflection, along with thorough radiological monitoring during the procedure

(EAU: strong recommendation). Adequate analgesia is crucial, as it enhances outcomes by minimizing pain-related movement (EAU: strong recommendation). In cases of infected stones or laboratory-confirmed infection, antibiotics should be administered before any intervention (AUA/EAU: strong recommendation). Routine stenting during ESWL is not recommended by the AUA, which also notes that the EAU finds no improvement in SFR with standard stenting, although it may reduce steinstrasse formation. Following ESWL, α-blockers can be prescribed to facilitate stone passage, but patients should be informed of this off-label use (AUA: moderate recommendation). The EAU outlines specific contraindications for ESWL, including uncontrolled UTIs, severe skeletal malformations and obesity, pregnancy, bleeding disorders, anatomical obstructions distal to the stone, and proximity to an arterial aneurysm.

Ureteroscopy (URS)

URS is linked to a higher SFR and superior clinical outcomes compared to ESWL [14]. The morbidity and complication rates associated with URS have significantly improved in recent years [15]. Both the AUA and EAU recommend against pre-procedural stent placement (strong recommendation). Although pre-stenting may lead to a higher SFR and reduced operative time, the lack of high-level evidence has led to a consensus against this practice. After the procedure, stenting should be avoided in patients not at increased risk for complications, as it is associated with greater morbidity and cost implications (EAU/AUA: strong recommendation). If stenting is necessary, both guidelines advocate for the use of α-blockers to alleviate stent discomfort (EAU: strong recommendation, AUA: moderate recommendation). Stone removal should always be performed under direct visualization, with the use of a safety guide wire recommended where feasible (AUA: expert opinion). The EAU suggests using a ureteral access sheath (UAS) for lengthy procedures or when dealing with large, multiple renal stones [16]. The EAU strongly recommends the use of the holmium–aluminium–garnet (Ho) laser for URS, noting that while the thulium fiber laser (TFL) shows comparable results, further comparative studies are needed. Both guidelines recommend administering prophylactic antibiotics prior to any endoscopic procedure. The EAU advocates for percutaneous antegrade URS if ESWL fails and retrograde URS is not feasible, as well as flexible URS for stones greater than 2 cm when PCNL and ESWL are not viable options (EAU: strong recommendation). URS is also preferred when stone removal is necessary without interrupting antithrombotic therapy (EAU/AUA: strong recommendation). Aside from general anesthesia risks and untreated UTIs, URS is generally considered safe for most patients without specific contraindications [5].

Percutaneous Nephrolithotomy (PCNL)

PCNL is the first-line treatment for larger renal calculi, offering a higher stone-free rate (SFR) due to its effectiveness, which is not constrained by stone burden or compositiondure, essential imaging is critical for delineating the anatomy of the collecting system and surrounding structures to ensure a safe percutaneous access path to the renal stone. This imaging can be performed via ultrasound (US) or computed tomography (CT) scan (EAU: strong recommendation). The AUA also strongly advocates obtaining a non-contrast CT (NCCT) prior to PCNL. Patient

positioning should depend on the surgeon's expertise and the available equipment. Both prone and supine positions are considered equally safe. Using smaller instruments with mini-percutaneous nephrolithotomy (mPNL, 12-22 Fr) is linked to shorter hospital stays, reduced blood loss, and SFRs comparable to those achieved with standard PCNL (greater than 22 Fr) . Flexible nephrosc be routinely employed in PCNL to facilitate the removal of fragments from areas that are inaccessible with a rigid nephroscope. To avoid electrolyte imbalances, normal saline should always be utilized as an irrigation solution during both PCNL and ureteroscopy (URS) (AUA: strong recommendation). If the procedure is uncomplicated, a tubeless PCNL (without nephrostomy) or totally tubeless approach (without nephrostomy and ureteral stent) is recommended, as these methods are associated with shorter inpatient stays and improved postoperative pain control (EAU: strong recommendation; AUA: conditional recommendation). A notable update in the EAU guidelines compared to earlier versions includes the recommendation to obtain a urine or stone culture directly from the renal pelvis during PCNL (EAU: strong recommendation). This practice addresses the risk of sepsis that can occur during or after the procedure, even in cases where preoperative urinary cultures are sterile. Cultures obtained directly from the pelvis provide more accurate predictions of potential septic episodes and help guide antibiotic the causative organisms. The EAU guidelines outline several contraindications for PCNL, including tumors in the access tract area, malignant renal tumors, pregnancy, untreated urinary tract infections (UTIs), and anticoagulant therapy, which must be carefully managed and discontinued before the procedure [17-20].

Open Surgery and Laparoscopy

Advancendourology have led to a decreased reliance on open and laparoscopic approaches for urolithiasis treatment. Both the EAU and AUA guidelines strongly recommend these surgical methods only in cases where shock wave lithotripsy (SWL), URS, and PCNL are unlikely to be effective or are expected to fail (EAU/AUA: strong recommendation). The AUA highlights scenarios involving stones in patients with anatomical defects that require reconstruction as instances where open or laparoscopic approaches may be more advantageous than endourological techniques [5].

Management

Ureteral stones that lead to acute renal colic typically present as emergencies necessitating immediate analgesia. Paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) are effective options for pain relief, often outperforming opioids, making them the preferred initial treatment after assessing for contraindications. These medications also help to decrease inflammation and mitigate the risk of pain recurrence in conservatively managed patients (EAU: strong recommendation). If pain persists despite analgesic treatment, renal decompression and endoscopic stone removal are indicated (EAU: strong recommendation). Sepsis resulting from an infected obstructed urinary system poses significant risks, contributing to high morbidity and mortality associated with urolithiasis and its treatment. Both the EAU and AUA recommend urgent decompression using either percutaneous nephrostomy (PCN)

or ureteric stenting, with neither method demonstrating superiority. Definitive treatment should be postponed until the sepsis is resolved, and prompt initiation of antibiotics is crucial, with adjustments made as sensitivity results become available. In cases requiring intensive care, a urine sample should be collected during decompression (EAU: strong recommendation). For ureteric stones, conservative management with a wait-and-watch strategy can be employed for patients without complications, with the likelihood of spontaneous stone expulsion inversely related to stone size (EAU: strong recommendation). The AUA recommends this approach specifically for stones measuring ≤10 mm, whereas the EAU uses the term "small" without specifying a size. The use of α-blockers as medical expulsive therapy (MET) for distal ureteric stones is supported by both organizations, with the AUA suggesting this for stones ≤10 mm and the EAU for stones <5 mm (AUA/EAU: strong recommendation). Active removal methods, such as shock wave lithotripsy (SWL) or ureteroscopy (URS), are recommended for patients with stones that are unlikely to pass, those causing obstruction, or patients experiencing pain despite adequate analgesia (AUA: clinical principle). Imaging should precede any intervention if there are changes in clinical status, and URS is favored as a first-line treatment for stones >10 mm, with either URS or SWL being appropriate for stones <10 mm (EAU: strong recommendation).

Types of Renal Stones

Renal stones, also known as kidney stones or uroliths, are solid aggregates formed in the kidneys from crystallization of various substances found in urine. These stones can lead to significant morbidity, including severe pain, urinary obstruction, and potential complications such as urinary tract infections (UTIs) and renal impairment. The composition and characteristics of renal stones vary widely, and understanding the different types is crucial for effective prevention and management strategies. The major categories of renal stones include calcium oxalate stones, calcium phosphate stones, struvite stones, uric acid stones, and cystine stones.

1. Calcium Oxalate Stones: Calcium oxalate stones are the most common type of renal stones, accounting for approximately 70-80% of cases. They are formed when calcium combines with oxalate, a substance found in many foods such as spinach, nuts, and chocolate. Calcium oxalate stones can be classified into two forms: monohydrate and dihydrate. Monohydrate stones, which are typically more dense and harder, often resemble a small, smooth pebble, while dihydrate stones are more common and have a characteristic dumbbell shape. Risk factors for calcium oxalate stone formation include dehydration, hypercalciuria (excess calcium in urine), and dietary factors, such as high oxalate intake and low calcium intake. Prevention strategies often focus on increasing fluid intake, modifying dietary habits, and managing underlying metabolic disorders.

2. Calcium Phosphate Stones: Calcium phosphate stones represent another significant category, comprising about 5-10% of renal stones. These stones form in alkaline urine and are associated with metabolic conditions such as renal tubular acidosis, primary hyperparathyroidism, and certain urinary tract infections. Calcium phosphate stones can appear in two forms: brushite and hydroxyapatite. Brushite stones are more soluble in urine, whereas hydroxyapatite stones are less soluble and can be more challenging to manage.

The treatment and prevention of calcium phosphate stones often involve addressing the underlying metabolic issues, maintaining adequate hydration, and adjusting dietary intake to minimize calcium and phosphate levels in the urine.

3. Struvite Stones: Struvite stones, also known as infection stones, are composed of magnesium ammonium phosphate and account for about 10-15% of renal stones. These stones commonly occur in patients with recurrent urinary tract infections caused by urea-splitting bacteria, such as Proteus species, which raise urine pH and facilitate stone formation. Struvite stones can grow rapidly, leading to the development of large staghorn calculi that may occupy the renal pelvis and calyces. The management of struvite stones typically involves the treatment of the underlying infection and may require surgical intervention, such as percutaneous nephrolithotomy or ureteroscopy, to remove the stones and prevent further complications.

4. Uric Acid Stones: Uric acid stones account for approximately 5-10% of renal stones and are formed from the crystallization of uric acid, a waste product resulting from the metabolism of purines found in high-protein foods such as red meat, fish, and certain legumes. These stones are more common in individuals with conditions such as gout, obesity, and metabolic syndrome. Uric acid stones are often radiolucent, making them difficult to detect on standard X-rays, but they can be visualized using ultrasound or computed tomography (CT). Treatment strategies focus on reducing urinary uric acid levels through dietary modifications, increased fluid intake, and medications that alkalinize the urine, such as potassium citrate.

5. Cystine Stones: Cystine stones are relatively rare, constituting about 1-2% of renal stones. They result from a genetic disorder known as cystinuria, which leads to excessive excretion of the amino acid cystine in urine. These stones typically form in acidic urine and can be quite large and difficult to manage. Cystine stones have a characteristic yellow-brown color and are often hexagonal in shape. The management of cystine stones involves increasing hydration to dilute urinary concentrations of cystine, dietary modifications to limit sodium intake, and medications such as thiol drugs that can help reduce cystine levels in the urine.

Conclusion

The rising prevalence of urolithiasis globally presents a multifaceted challenge that necessitates both an understanding of the condition and the implementation of effective treatment strategies. The reviewed literature underscores the importance of recognizing urolithiasis as a significant health concern, especially as it predominantly affects individuals over the age of 30. The financial burden associated with managing this condition is substantial, highlighting the necessity for effective and cost-efficient treatment options. Natural remedies for renal stones, as discussed in this review, demonstrate promising potential in both prevention and management. Dietary modifications, increased fluid intake, and certain herbal supplements can play a role in mitigating stone formation and aiding in their passage. However, the efficacy of these remedies must be considered in conjunction with conventional treatment methods to ensure comprehensive patient care. While guidelines from the AUA and EAU provide robust frameworks for managing urolithiasis, the integration of natural remedies offers an avenue for enhancing patient outcomes. These guidelines, while

informative, cannot guarantee optimal results for every patient, necessitating a personalized approach that factors in individual circumstances, preferences, and responses to treatment. As the healthcare landscape evolves, further research is essential to establish the effectiveness and safety of natural remedies in urolithiasis management. Clinical trials and comparative studies will contribute to a more substantial body of evidence, informing practitioners about the best practices for incorporating natural remedies alongside established treatment modalities. In conclusion, while urolithiasis remains a prevalent and costly condition, a multifaceted treatment approach that includes natural remedies offers hope for improved patient management. By prioritizing research and clinical innovation, healthcare providers can better address the complexities of urolithiasis and enhance the quality of life for affected individuals.

References

1. Sorokin, I.; Mamoulakis, C.; Miyazawa, K.; Rodgers, A.; Talati, J.; Lotan, Y. Epidemiology of stone disease across the world. *World J. Urol.* **2017**, *35*, 1301–1320.
2. Raheem, O.A.; Khandwala, Y.S.; Sur, R.L.; Ghani, K.R.; Denstedt, J.D. Burden of Urolithiasis: Trends in Prevalence, Treatments, and Costs. *Eur. Urol. Focus* **2017**, *3*, 18–26.
3. American Urological Association. Kidney Stones: Medical Mangement Guideline. Available online: **https://www.auanet.org/guidelines-and-quality/guidelines/kidney-stones-medical-mangement-guideline** (accessed 2023).
4. American Urological Association. Kidney Stones: Surgical Management Guideline. Available online: **https://www.auanet.org/guidelines-and-quality/guidelines/kidney-stones-surgical-management-guideline** (accessed 2023).
5. Skolarikos, A.; Jung, H.; Neisius, A.; Petřík, A.; Somani, B.; Tailly, T.; Gambaro, G. Uroweb-European Association of Urology [Internet]. EAU Guidelines on Urolithiasis-INTRODUCTION-Uroweb. Available online: **https://uroweb.org/guidelines/urolithiasis** (accessed 2023).
6. Faraday, M.; Hubbard, H.; Kosiak, B.; Dmochowski, R. Staying at the cutting edge: A review and analysis of evidence reporting and grading; the recommendations of the American Urological Association. *BJU Int.* **2009**, *104*, 294–297.
7. Guyatt, G.H.; Oxman, A.D.; Vist, G.E.; Kunz, R.; Falck-Ytter, Y.; Alonso-Coello, P.; Schünemann, H.J. GRADE Working Group GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* **2008**, *336*, 924–926.
8. Hughes, T.; Ho, H.C.; Pietropaolo, A.; Somani, B.K. Guideline of guidelines for kidney and bladder stones. *Turk. J. Urol.* **2020**, *46* (Suppl. 1), S104–S112.
9. Worster, A.; Preyra, I.; Weaver, B.; Haines, T. The accuracy of noncontrast helical computed tomography versus intravenous pyelography in the diagnosis of suspected acute urolithiasis: A meta-analysis. *Ann. Emerg. Med.* **2002**, *40*, 280–286.
10. Salinawati, B.; Hing, E.Y.; Fam, X.I.; Zulfiqar, M.A. Accuracy of ultrasound versus computed tomography urogram in detecting urinary tract calculi. *Med. J. Malays.* **2015**, *70*, 238–242.

11. Linsenmeyer, M.A.; Linsenmeyer, T.A. Accuracy of bladder stone detection using abdominal x-ray after spinal cord injury. *J. Spinal Cord Med.* **2004**, *27*, 438–442.
12. Lingeman, J.E.; Coury, T.A.; Newman, D.M.; Kahnoski, R.J.; Mertz, J.H.; Mosbaugh, P.G.; Steele, R.E.; Woods, J.R. Comparison of results and morbidity of percutaneous nephrostolithotomy and extracorporeal shock wave lithotripsy. *J. Urol.* **1987**, *138*, 485–490.
13. Pearle, M.S.; Lingeman, J.E.; Leveillee, R.; Kuo, R.; Preminger, G.M.; Nadler, R.B.; Macaluso, J.; Monga, M.; Kumar, U.; Dushinski, J.; et al. Prospective, randomized trial comparing shock wave lithotripsy and ureteroscopy for lower pole caliceal calculi 1 cm or less. *J. Urol.* **2005**, *173*, 2005–2009.
14. Dasgupta, R.; Cameron, S.; Aucott, L.; MacLennan, G.; Thomas, R.E.; Kilonzo, M.M.; Lam, T.B.L.; N'Dow, J.; Norrie, J.; Anson, K.; et al. Shockwave Lithotripsy Versus Ureteroscopic Treatment as Therapeutic Interventions for Stones of the Ureter (TISU): A Multicentre Randomised Controlled Non-inferiority Trial. *Eur. Urol.* **2021**, *80*, 46–54.
15. Cui, X.; Ji, F.; Yan, H.; Ou, T.-W.; Jia, C.-S.; He, X.-Z.; Gao, W.; Wang, Q.; Cui, B.; Wu, J.-T. Comparison between extracorporeal shock wave lithotripsy and ureteroscopic lithotripsy for treating large proximal ureteral stones: A meta-analysis. *Urology* **2015**, *85*, 748–756.
16. Lima, A.; Reeves, T.; Geraghty, R.; Pietropaolo, A.; Whitehurst, L.; Somani, B.K. Impact of ureteral access sheath on renal stone treatment: Prospective comparative non-randomised outcomes over a 7-year period. *World J. Urol.* **2020**, *38*, 1329–1333.
17. Srisubat, A.; Potisat, S.; Lojanapiwat, B.; Setthawong, V.; Laopaiboon, M. Extracorporeal Shock Wave Lithotripsy (ESWL) Versus Percutaneous Nephrolithotomy (PCNL) or Retrograde Intrarenal Surgery (RIRS) for Kidney Stones. *Cochrane Database Syst. Rev.* **2014**. Available online: **https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD007044.pub3/full**
18. Jones, P.; Elmussareh, M.; Aboumarzouk, O.M.; Mucksavage, P.; Somani, B.K. Role of Minimally Invasive (Micro and Ultra-mini) PCNL for Adult Urinary Stone Disease in the Modern Era: Evidence from a Systematic Review. *Curr. Urol. Rep.* **2018**, *19*, 27.
19. Whitehurst, L.; Jones, P.; Somani, B.K. Mortality from kidney stone disease (KSD) as reported in the literature over the last two decades: A systematic review. *World J. Urol.* **2019**, *37*, 759–776.
20. Liu, M.; Chen, J.; Gao, M.; Zeng, H.; Cui, Y.; Zhu, Z.; Chen, H. Preoperative Midstream Urine Cultures vs Renal Pelvic Urine Culture or Stone Culture in Predicting Systemic Inflammatory Response Syndrome and Urosepsis After Percutaneous Nephrolithotomy: A Systematic Review and Meta-Analysis. *J. Endourol.* **2021**, *35*, 1467–1478.

حصى الكلى - مراجعة محدثة حول العلاجات الطبيعية

الملخص:

الخلفية :تعدّ حصيات المسالك البولية مشكلة صحية عالمية شائعة تتميز بتكوين حصى في الكلى، مما يؤثر بشكل كبير على جودة حياة المرضى وتكاليف الرعاية الصحية. إن الزيادة في حدوث حصى الكلى، خاصة بين الأفراد الذين تزيد أعمارهم عن 30 عامًا، تضع عبئًا ماليًا كبيرًا على أنظمة الرعاية الصحية، حيث تصل التقديرات إلى 5.3 مليار دولار أمريكي في عام 2014.

الهدف :تهدف هذه المراجعة إلى تقديم نظرة شاملة حول أحدث العلاجات الطبيعية لإدارة حصى الكلى، مناقشة فعاليتها ودمجها في أنماط العلاج الحالية.

الطرق :تم إجراء مراجعة شاملة للأدبيات، مع التركيز على الدراسات الحديثة والإرشادات السريرية من منظمات مثل الجمعية الأمريكية لطب المسالك البولية (AUA) والجمعية الأوروبية لطب المسالك البولية .(EAU) تم تحليل فعالية العلاجات الطبيعية المختلفة جنبًا إلى جنب مع خيارات العلاج التقليدية.

النتائج :تحدد المراجعة عدة علاجات طبيعية قد تكمل العلاجات التقليدية لحصى الكلى. تشمل هذه التعديلات الغذائية، واستراتيجيات الترطيب، والمكملات العشبية التي تظهر فوائد محتملة في الوقاية من الحصى وإدارتها.

الخلاصة :بينما تظل العلاجات الطبية التقليدية حجر الزاوية في إدارة حصيات المسالك البولية، قد تقدم العلاجات الطبيعية خيارات مساعدة قيمة. يتطلب الأمر مزيدًا من البحث لتأسيس بروتوكولات موحدة لدمج هذه العلاجات في الممارسة السريرية.

الكلمات المفتاحية :حصى المسالك البولية، حصى الكلى، العلاجات الطبيعية، العلاج، حصى الكلى، عبء الرعاية الصحية.