

# Knowledge, Awareness and Practice on Dietary Management among Patients with Urolithiasis: A Scoping Review

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## ABSTRACT

Urolithiasis or kidney stone has strong association with lifestyle. The pattern of recurrent episodes reported is alarming and if left untreated will lead to serious conditions such as cancer or ablative surgical intervention. Therefore, this scoping review was performed to provide an overview on knowledge, awareness and practice (KAP) of dietary management among patients with urolithiasis. Published studies within 2010 until 2020 on KAP among urolithiasis patients globally and Malaysia were searched through five databases including ProQuest Health and Medical Complete, Wiley Online Library, EBSCO Host, Science Direct and Scopus. The quality appraisal was performed using Freestyle Critical Appraisal. Two of the authors involved in screening the relevant literature while the supervisor involved in peer checking the appraisal performed. A total of eight publications; five original studies and three review papers were obtained but none was from Malaysia. Only five were reviewed systematically on the basis of its completeness for quantitative synthesis on design, population, methodology and instrumentation. The scope of interest was awareness of urolithiasis, knowledge on risk factors, sign and symptoms, treatment and preventive measure, as well as the relationship between urolithiasis and socio-demographic background. The findings highlighted an association between socio-demographic background such as age, gender, education level, income status, literacy level towards KAP among urolithiasis patients on dietary management. Lifestyle pattern such as food intake and weight management were crucial to prevent recurrent episode Proper dietary management was an early intervention to prevent recurrent episodes of urolithiasis. Health education efforts may be helpful to increase awareness and knowledge among patients and this need to be performed by multidisciplinary effort.

**Keywords:** Knowledge; Awareness; Dietary practice; Urolithiasis patients

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## INTRODUCTION

Urolithiasis is a terminology to describe the calculi or stone that forms in the urinary tract. The pattern of urolithiasis varies regarding its epidemiological findings, stone composition, site of formation, risk factors, lifestyle habits and metabolic factors implicated in pathogenesis. The calcification may form in the urinary system, usually kidneys or ureters, but may affect the bladder or urethra. About 1 to 19 percent of Asian population suffers from urolithiasis in comparison to western population which range between 1 to 15% [1,2]. However, the prevalence and incidence have changed globally over the years due to variations in socio-economic status and geographic location [1-3]. To date, an epidemiological finding on urolithiasis is still scarce in Malaysia as well as the other South East Asia region. Most of the studies found were carried out at hospital-based level which limits the generalization of the findings [1].

Urolithiasis is classified according to their chemical composition such as calcium, cystine, struvite, uric acid and other rare types of stones [3,4]. Main causes of the stone formation are decreased urine volume or increase excretion of stone-forming components such as calcium, oxalate, urate, cystine, xanthine, and phosphate. The calculi may remain within the renal parenchyma or renal collecting system or pass into the ureter and bladder. Sometimes, the calculi may irritate the ureter during passage and may lodge or obstruct urine flow causing dilation of the ureter (hydroureter) or swelling of a kidney due to a build-up of urine hydronephrosis [4,5]. In lieu of this, urolithiasis is manifested by having blood stain in urine (hematuria), colicky pain at the abdominal, flank or groin area [3-5].

Urolithiasis cases has an increasing trend globally of being seen at the emergency department and affects diverse age groups including children, teenagers, adults and elderly [6,7]. Men are prone to experience urolithiasis than women as reported by previous studies [6,7]. Moreover, urolithiasis is a complex disease characterized by recurrent and relapse episodes which has strong association with socio-economic status particularly income level [8,9]. Apart from that, countries that are located in the Afro-Asian

region such as Sudan, Egypt, India, Pakistan and Saudi Arabia reported higher incidence of urolithiasis due to high temperate climate [7]. About 80% of patients predominantly have calcium oxalate and/or calcium phosphate stones [4,5]. Uric acid, struvite and cystine stones are rare [4,5].

There is dietary and medical therapy to treat urolithiasis and dietary modification is an effective way and less costly. Increasing the knowledge on urolithiasis will enable patient to identify of sign and symptoms as well as risk factors of urolithiasis [8,10-13]. An improvement in knowledge will affect changes in the dietary and lifestyle practice in prevention of incidence or recurrent episode [9,14-21]. Further explanation and health education are very important to ensure that the patients practice the dietary recommendation correctly. The health education should be provided suitable with patient's socio-demographic background, particularly their educational level. Therefore, this scoping review was performed to provide an overview on knowledge, awareness and practice (KAP) of dietary management among patients with urolithiasis.

## METHODS

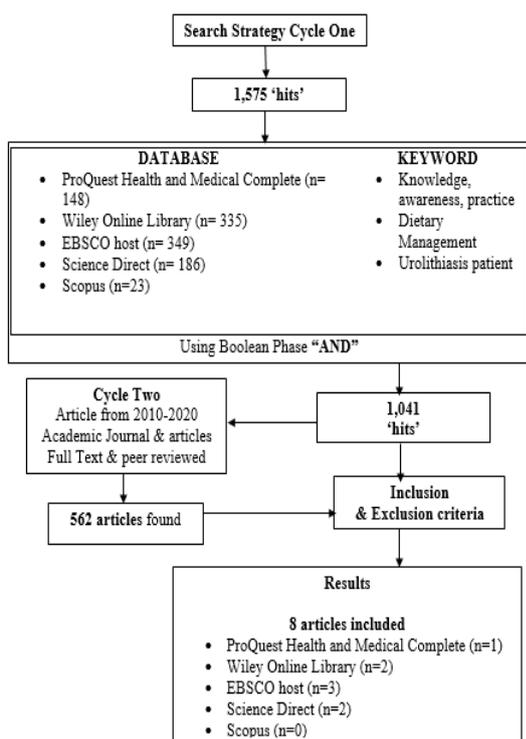
All literatures published from 2010 to 2020 was searched through five databases including ProQuest Health and Medical Complete, Wiley Online Library, EBSCO Host, Science Direct and Scopus using Boolean Operator "AND" to combine the following keywords: 1) knowledge, 2) awareness, 3) practice, 4) dietary management and 5) urolithiasis patient. A total of eight publications from 2010 to 2020 were included but none was from Malaysia (Figure 1). There were five original studies and three review articles. The searched need to be extended up to 10 years since lack of studies look evaluated the KAP instead focus on biomedical approach. Researchers only concentrated on the original studies since they addressed clearly the study design, population sampling, methodology and illustrated the instrumentation and strategies used to obtain information about KAP (Table 1). The researchers focused on the studies that utilized a food frequency questionnaire (FFQ), multiple-choice questionnaire (MCQ) on Diet History Questionnaire (DHQ) and office-based

interview as their instrumentation during data collection method.

*Search strategy*

The articles searched were guided by filters which enable the researchers to sort out the selection based on fixed criteria using advanced search. The resources were filtered by format or sources type, language, subject and date of availability. The researchers have selected scholarly journals, written in English language, subjects matter related to urolithiasis published in medical and nursing field, published within ten years (2010 to 2020) and limited the articles to full text format as well as peer reviewed. The search excluded those published articles on animals and plants study along with those not related to dietary management of urolithiasis (Figure 1).

**Figure 1:** Flow Diagram Showing Search Strategy



Then, the keywords used in the search were specified using Boolean operators of “AND” to narrow down the search topic. The researcher mostly used the location of the availability of the keywords in “anywhere” included document title, document text and abstract. The most keywords used in the search strategy were “knowledge”, “awareness”, “practice”,

“dietary management” and “urolithiasis patient”. Altogether, 1,575 articles related to dietary management for urolithiasis patient were found during search through five databases mentioned earlier using the three keywords. Then, resources were filtered using the Boolean operator “AND” which limit the search further to 1,041 articles (Figure 1).

After that, 562 articles found were then filtered once again based on the inclusion and exclusion criteria mentioned earlier. After going through abstract reading, finally 8 articles were selected, reviewed, and implied in this research (Figure 1). Confirmation was made between the researchers and supervisor during articles selection by practicing peer checking among the members. Later, the selected articles were appraised using Freestyle Critical Appraisal, a copyrighted instrument by the supervisor for quantitative studies [22].

Finally, five articles were reviewed systematically on the basis of its completeness for quantitative synthesis on design, population, methodology and instrumentation (Table 1). The scope of interest was awareness of urolithiasis, knowledge on risk factors, sign and symptoms, treatment, and preventive measure, as well as the relationship between urolithiasis and socio-demographic background. The results will be reported according to the three parts as follows: -

- A. Association of urinary tract stone (urolithiasis) and socio-demographic background
- B. Prevention, treatment and management of urolithiasis
- C. Knowledge, Attitude and Practice on dietary management in other countries

**RESULTS**

**Association of urinary tract stone (urolithiasis) and socio-demographic background**

*Age*

Previous studies addressed that urolithiasis increasing in all age groups and predominantly among patients between 20-55 years old [6,7]. The prevalence of urolithiasis was highest in male aged between 30 to 50 while in female among those aged 40 to 60 [7].

**Table I:** List of publish paper to explore knowledge, awareness and practice on dietary management of urolithiasis

Author and year of study	Place of study	Study design	Participants	Method of administration
Heningburg et al., 2016 (15)	Washington University	Cross-sectional study	Patients attended at the Stone Clinic	Office-based interview and FFQ
Moussa & Abou Chakra, 2019 (6)	Zahra Hospital at Beirut	Not mentioned clearly	Patients diagnosed with urolithiasis in ED	Self- administered questionnaire
Ortiz-Alvarado et al., 2011 (18)	University of Minnesota	Retrospective cohort study	Patients treated at the Stone Clinics	Two sequential 24-hour urine collection
Saint-Elie et al., 2010 (8)	Emory University Hospital & Grady Memorial Hospital	Cross-sectional study	Patients with history of urolithiasis	DHQ and Socio-Economic Status Questionnaire (SES)
Shirazi et al., 2014 (7)	Hasheminejad Urology Centre	Case-control study	Patients with urolithiasis and healthy subjects	Anthropometric measurement and FFQ

#### *Gender*

Men are more prone to experienced urolithiasis in comparison to women as commonly reported in several studies [6–8,15,18]. The results from previous studies showed that the prevalence of urinary stone was higher in male than in female by the ratio of 2:1 [7,8]. The higher prevalence among males can be attributed by biological factors such as sex hormones where androgens appeared to be increased while estrogens decreased, amount of urinary oxalate excretion and calcium oxalate deposited in the body [7].

#### *Socio-economic status*

There was a supporting statement by a study highlighted that level of education and income status affects one's dietary pattern [8,18]. The patients from higher SES had chosen healthier food than those from lower SES. The study addressed significant mean dietary constituents by education level (lower vs higher) were calcium (1058.4 vs 705.0 mg/d), carbohydrate (394.9 vs 253.4 g/d), cholesterol

(398.7 vs 253.4 mg/d), dietary fiber (24.6 vs 17.9 g/d), food energy (3307.9 vs 2051.5 kcal/d), phosphorus (1903.9 vs 1220.1 mg/d), potassium (4195.6 vs 2861.5 mg/d), and sodium (5136.8 vs 3050.5 mg/d) with a significant value of  $p < 0.05$  [8]. On the other hand, patients from low-income status has higher magnesium intake (481.8 vs 316.7 mg/d) with a significant value of  $p < 0.05$  [8].

#### *Dietary practice and lifestyle behaviour*

Eating habit was the main factors contributing towards the formation of stones in the urinary tract. Various studies have shown a link between high animal protein diets and increased incidence of kidney disease [7, 15, 18]. Thus, it was recommended to adopt an animal-free vegetarian diet which lower the risk of urolithiasis [7, 15, 18]. Moreover, food with high sodium content increased urinary calcium and phosphate that facilitated the formation of uric acid crystals and reduced urinary citrate which caused stone formation [7, 15, 18].

For calcium stone prevention, oral calcium restriction has traditionally been the main dietary recommendation similarly addressed to limit the oxalate diet for those at risk for oxalate stone formation [7,15,18]. On the other hand, purine banned was recommended to reduce the risk of stones for patients with uric acid-stones [7,18]. Usually, dietary education or counselling was based on the type of stone experienced by the patient [7,8,18]. Dietary recommendations specifically for each patient can only be made after accurate metabolic assessment, stone analysis or minimally obtained dietary information through FFQ [7,8,15].

Another important element in prevention of urolithiasis was increasing the plain water intake [7,15,18]. Various studies have explained the effect of fluid intake and urine volume on the risk of kidney stone formation and prevention of stone recurrence [7,15,18]. High water intake and dilution of urine caused a significant decreased in lithogenic salt saturation. The type of fluid should be carefully selected to achieve a change in the composition of the appropriate urine volume depending on the composition of the stone [7,15,18].

At the same time, each patient must achieve an ideal weight by controlling their body mass index (BMI) to at least achieved the normal weight of 24.9kgm<sup>-2</sup>. Obesity has been contributed towards the rising numbers of patients with urolithiasis as it was significantly associated with insulin resistance and metabolic abnormalities [7,8]. Therefore, healthy lifestyle including good dietary practice, encouragement of regular and continuous exercise can be an effective measure in preventing recurrence of urolithiasis.

#### *Prevention, treatment and management of urolithiasis*

Early prevention was important to reduce the episodes of urolithiasis by raising awareness and promote healthy lifestyle to the patients by the healthcare professionals from multidisciplinary background [6-8,18]. Meanwhile, the secondary prevention was focused to patients who were at risk for recurrent stones formation such as those with multiple morbidities or practicing non-healthy lifestyle behaviour particularly on dietary

intake. These categories of patients usually require continuous advice on drinking enough water and good eating habits [6-8,15,18].

A moderate dietary calcium intake, low protein, and low sodium level was associated with a reduced risk of stone formation [15,18]. Furthermore, close attention shall be taken in choosing vegetables and fruits in daily dietary intake [7,8,18]. Certain vegetarian diets were associated with greater amounts of urine and citrate excretion but increased oxalate formation along with uric acid. Thus, having knowing the nature of stones and daily dietary intake were recommended to tailored the needs of the patients in modifying their dietary intake [7, 8, 15].

#### *Knowledge, Attitude and Practice on dietary management in other countries*

Based on the search, limited study was done on the aspect of KAP on urolithiasis among patients globally as well as in Malaysia. A study conducted in Atlanta, Georgia showed that urolithiasis patients had poor knowledge about dietary management and risk factors of urolithiasis [8]. This was the reason why healthcare provider should give an explanation and instruction regarding the dietary management in order to increase the patients' level of knowledge, awareness and adherence towards dietary management. On the other hand, study from Beirut highlighted that most of the patients in their study did not received recommendation by the healthcare professionals in emergency department after diagnosed with urolithiasis [6]. Therefore, healthcare provider should adopt giving health education even in brief to all the patients disregard of settings tailored to their socio-economic background since patients were concerned about their health status [6-8].

A collaborative management by multidisciplinary healthcare professionals like physician and dietician proven that dietary assessment using electronic food frequency questionnaire (FFQ) apart of regular physician assessment was an integral component of a preventive measure for managing stone cases [7,8,15]. At the same time, FFQ was an accurate assessment to measure the patient's dietary habits and indirect measure of adherence with recommendations [7,8,15]. To conclude, this

review addressed the important to have more research that measures the level of knowledge, awareness and practice on urolithiasis particularly among patients in Malaysia setting.

## CONCLUSION

From the above studies mentioned, most of them addressed lack of knowledge, poor practice on dietary intake and low level of awareness on urolithiasis among the patients. It was believed that level of education and income status give impact on dietary habits of urolithiasis patients. Although different angle of dietary factors was assessed in those studies, nevertheless it revealed the needs to raise the level of knowledge, awareness and practice among urolithiasis patients towards improving their dietary intake to prevent recurrent episodes.

Thus, health education plays very important role to ensure that the patients have knowledge and awareness regarding urolithiasis as well as practice the dietary recommendation correctly. This can only be achieved by strong commitment from the multidisciplinary healthcare professionals that consistently in delivering the content and advice in synchronize manner. At the same time, using simple questionnaire like FFQ has been helpful even in monitoring urolithiasis dietary intake to supplement the physician assessment of stone risk and in deciding appropriate management of stone disease.

## CONFLICT OF INTEREST

The authors acknowledge that the publishing of this paper does not have any conflict of interest.

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