



African Journal of Urology

Official journal of the Pan African Urological Surgeon's Association
web page of the journal

www.ees.elsevier.com/afju
www.sciencedirect.com



Stones and Endourology

Original article

Assessment of the prevalence of kidney stone diseases in a Malaysian teaching hospital

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Received 26 March 2018; received in revised form 2 May 2018; accepted 27 May 2018; Available online xxx

KEYWORDS

Kidney stones;
Malaysia;
Prevalence;
Disease epidemiology

Abstract

Introduction: Kidney stones can be formed by the precipitation or crystallization of minerals and urinary constituents. It is a common problem worldwide manifested with recurrent intermittent pain episodes, surgical interventions, medication consumption which affect the quality of life of the patients.

Objectives: This study aimed to assess the prevalence of kidney stone disease among patients admitted to Hospital Universiti Sains Malaysia (HUSM). Also, to determine the characteristics of stones, sociodemographic, and comorbid conditions.

Subjects and methods: The study was a retrospective cross-sectional study design. A list of all patients admitted to HUSM for five years (January 1st, 2012 to December 31st, 2016) was retrieved. The statistical analysis included the calculation of descriptive statistics, Kolmogorov–Smirnov test of normality, and Mann–Whitney U test to compare medians.

Results: The prevalence of patients with kidney stones disease was 1.8% among patients admitted to HUSM. Male patients were more than females with a ratio of 1.35:1, the majority of patients were of Malay ethnicity (91.1%, n = 133). There was poor documentation about the physicochemical properties of the kidney stones. The treatment of kidney stones was individualized between patients according to their cases, shockwave lithotripsy was the most prevalent mode of treatment among patients (45%, n = 67).

Conclusions: Future national studies are needed to better assess the scope of the disease epidemiological measures, and to determine kidney stone formation pattern in the Malaysian population. As healthcare provision that copes with the significance of the disease will assure better outcomes.

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Peer review under responsibility of Pan African Urological Surgeons' Association.

<https://doi.org/10.1016/j.afju.2018.05.003>

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Introduction

A Kidney stone, or calculi, can be formed by the precipitation or crystallization of minerals and urinary constituents such as calcium oxalate, calcium phosphate, cystine or uric acid in the kidney. Urolithiasis is a common problem worldwide with remarkable health and economic burden. It is regarded as a common cause of morbidity. After urinary tract infections and prostate diseases, kidney stone disease is considered as the third most common disease in urology [1,2].

Therapy for urolithiasis has undergone many changes. The advent of non-invasive and minimal-invasive procedures has revolutionized the surgical approach to kidney stones treatment [3]. However, the mode of treatment is individualized from patient to patient, as it depends on a variety of factors such as stone location, stone size, stone physicochemical properties, and patient's preferences.

Renal colic is the acute cramping and intermittent abdominal and flank pain caused by kidney stones. The increased wall tension caused by urinary flow obstruction together with the contraction of the ureteral smooth muscle in an attempt to move the stone stimulates the synthesis of prostaglandins. This will cause inflammation, edema formation, and the painful spasms [4-7].

Although it is not a mortal disease, kidney stone disease is a devastating disease, the recurrent intermittent pain episodes, surgical interventions, medication consumption and facing the risk of side effects, all of which affect the quality of life of the patients [8,9].

Sreenevasan G. presented the incidence of kidney stones in Malaysia by comparing between a study conducted at 1980 covered years of 1962-1976 and a study conducted at 1989 covered the period 1977-1981 [10,11]. It studied ethnicity, sex, and age distribution of kidney stones among the three major races (Chinese, Malay, and Indians). It concluded that there was no significant variation consistent with Malaysia population. Of more than four thousand diverse subjects with kidney stones; ~37% were Malay, while ~48% were Chinese, and around 13% Indian. From the point of age distribution, in all ethnic groups, the highest incidence found to be between the ages of 30-50 and domination of male to female ratio. Alatab et al. published a review using the same references showing that the incidence of urolithiasis had a steady increase, although it presented the only incidence of kidney and ureter stones without showing the incidence of stones in other parts of renal tracts.

This study aimed to give insight on the epidemiological aspects of kidney stones in Malaysia by determining the prevalence of kidney stones disease among patients admitted to Hospital Universiti Sains Malaysia (HUSM) in the period of 1st January 2012 to 31st December 2016. Also, to determine the characteristics of stones, sociodemographic, and comorbid conditions that are involved with kidney stone patients in HUSM.

Subjects and methods

A retrospective cross-sectional study design was conducted. Medical records review (MRR), also known as retrospective chart review (RCR), is a type of research design depends on the already presented information in medical records that are not documented for research purposes. In general, it exists either as electronic medical records or

paper-based files. However, in HUSM, the documentation method is paper-based except for lab investigations exists in electronic form [12].

The study population was all patients diagnosed and registered as kidney stones disease patient in medical records of a tertiary care center of North-East Peninsular Malaysia, HUSM.

A list of all patients admitted to HUSM for five years (January 1st 2012 to December 31st 2016) was retrieved. A total number of admissions to HUSM in the specified period of time was 199,318 admissions. The total number of patients above 18 years old admitted to HUSM was 86,039 patients.

In order to calculate the prevalence of kidney stones disease among the patients admitted to HUSM, steps start with collecting a random sample from them and differentiate between kidney stones disease patients and non-kidney stones disease patients as shown in Fig. 1.

Review of studies related to kidney stones disease in the Asian countries neighboring to Malaysia and the stone-forming belt was done. Based on epidemiological reports in these studies, the study assumed that the expected prevalence will be around 10%. The current study will use a confidence level of 95% with an acceptable margin of error of 1%.

The study including in the kidney stone group only those who were admitted to hospital with a stone during the period of study, patients who previously had a history of stones but did not have a stone episode during the period of study were not included.

Patients who passed stones spontaneously were considered for inclusion in the study, the study was not limited to those who had to be hospitalized to remove their stones.

Sample size calculation was done by using Epi InfoTM Calculator for a descriptive study/population survey. Epi InfoTM is a data collection, management, analysis, visualization, and reporting software for public health professionals. Epi InfoTM is a trademark of the Centers for Disease Control and Prevention (CDC). The software is in the public domain and freely available for use, copying translation and distribution. After applying the inputs, the needed sample size is 3324 patients.

Simple random sampling was chosen to select patients. Of the list generated by medical records office for all patients admitted to HUSM, each patient given a number between 1 and 86,039. Then, the list was sorted according to (Medical Record Number), which was a step that will mix and scatter the records before the actual randomization step. Using the computer software (Research Randomizer) to generate random numbers in order to randomly select the representative sample of medical records out of the whole population of patients admitted to HUSM. Subsequently, a simple random sample of 3324 patients was obtained.

In order to differentiate between patients with kidney stones disease and normal patients of the generated random sample of patients, a list of the patients retrieved from the medical record office department in HUSM. HUSM has software that uses international classification of disease "ICD-10 Version: 2010, WHO" as a coding system for each patient according to diagnosis. The researcher chose all keywords that are relevant to kidney stones disease (N20; N21; N22; N23) for

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