Determination of Contributing Risk Factors to Adult Nephrolithiasis Patients

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الخلاصـة:

الهدف: لغرض تحديد عوامل الخطورة المساهمة في تكوين حصى الكلى.

المنهجية: دراسة وصفيةتمّ اجرائها لتحديد عوامل الخطورة المساهمة في تكوين حصى الكلى للمرضى البالغين والتي بدأت من تشرين الثاني ٢٠٠٧ حتى نهاية أيلول 2008. اختيرت عينة غير احتمالية (غرضية) مكونة من (100) مريض مصاب بحصى الكلى دخلوا المستشفيات ومراجعين العيادات الخارجية فيها ومراجعين قسم تفتيت الحصى.تضمّنت الاستمارة قسمين؛ الأول متعلق بالمعلومات الشخصية والديموغرافية والثاني تم تصميمه لتحقيق أغراض الدراسة حيث بلغ مجموع مفردات الاستمارة (٨٥) مفردة،تمّ تحديد مصداقية محتوى الاستمارة من خلال لجنة تحكيم مكونة من (١٢) خبير من الذين لهم علاقة بالدراسة، حدد ثبات الاستمارة من خلال اجراء الدراسة الاستطلاعية. حللت البيانات من خلال اعتماد أسلوبي الإحصاء الوصفي والإحصاء الاستنتاجي.

النتائج:أغلبية عيّنةِ الدراسةَ (٧٠%) كَانتْ من الذكورَ، معظمهم (٣٠%) كَانَ من المجموعةَ العُمرية (٤٨-٣٧) سنةتَزَوّجين. معظمهم (٦٤ %) موظفين، خريجي الدراسة الثانويةالعيّنةِ كَانتْ تَعِيشُ في بغداد، وكَانَ عِنْدَها قلةُ في الماء الصالح للشربِ. أغلبيّنةِ كَانَ عِنْدَها تأريخُ أسَريُ لمرض حصى ألكلية، وتتعرّضإلى المناخِ الحارِ .

التوصيات: الإكثار من شرب السوائل وخصوصاً الماء لمنع حدوث تكرار الحصىوزيادة الأغذية المحتوية على ألياف وأيضاً التقليل من تناول المشروبات مثل (الصودا والشاي والقهوة) مع زيادة الحركة والتمارين.

Abstract

Objectives: To determine the contributing risk factors to adult nephrolithiasis patients.

Methodology: A descriptive study was conducted to determine the contributing risk factors to Adults nephrolithiasis starting from December 2007 to September 2008. A purposive "non-probability" sample of (100) patients with nephrolithiasis was selected of those who were admitted to the hospitals, attending the Urology Consultation Clinic and Extracorporeal Shock Wave Lithotripsy Department. The study instrument consists of two parts. The first part is related to the patients' demographic variables and the second part is constructed to serve the purpose of the study. The total number of items in the questionnaire was (85) ones.
Content Validity of the instrument was determined through the use of a panel of (12) expert in the field of the study. Reliability of the instrument was estimated through the pilot study. Data were analyzed through descriptive data analysis and the inferential data analysis approaches.

Results: The majority of the study sample (70%) was males. Most of them was (38-47) years old (30%) and married. Most of them (64%) was employed, and secondary school graduated. The majority of the sample was living in Baghdad and had lack in fluid intake. Most of the sample had family history of nephrolithiasis, and exposed to hot climate.

Recommendations:
Increase fluid intake (especially water) and high fiber-low protein, salt and fat diet. Decrease beverage intake of soft drink, tea and coffee and increase of activity and exercise.

Keywords: Contributing Risk Factors; Adult Nephrolithiasis Patients

Introduction:

Nephrolithiasis is one of the most painful urologic disorders has best humans for centuries. Scientists have found evidence of kidney stone in a (7000) year-old Egyptian mummy [(1)]. National Institute of Digestive and Diabetes and Kidney Diseases (NIDDK) estimates that up to ten percent of Americans will have a kidney stone at some point in their lives [(2)]. For unknown

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reasons, the number of people in the United States with kidney stones has been increasing over the past (30) years [3].

Nephrolithiasis is a worldwide disease with high clinical and economic costs. The increasing incidence in industrialized countries seems to be related to several risk factors, which are partly inherited and partly acquired [4]. About (5 %) of women and (10 %) of men will have at least one episode by age (70). A person who has had kidney stones often gets them again in the future [5].

Nephrolithiasis can be made of uric acid, cystine, xanthenes, magnesium phosphate, magnesium carbonate, calcium phosphate, calcium carbonate, or calcium oxalate. Approximately, (85%-95%) of kidney stones contain calcium in some form and (70-80 %) are made of calcium oxalate [6]. Men are (4-5) times more likely to develop calcium or uric acid stones. Women are more likely to develop Struvite stone [8].

The nephrology nurse adheres to all applicable regulations, statutes, and practice acts. The nephrology nurse is responsible for the care of adult patients with kidney disease [7].

Methodology:

A quantitative design descriptive study (retrospective) was conducted to determine the risk factors that contribute to nephrolithiasis which has started from December 2007 to September 2008. Administrative permissions were obtained from Ministry of Planning and Development Cooperation, Central Organization Statistics and Information Technology, Ministry of Health, Planning and Health Research Directorate. The study was conducted at Al-Kindey, Specialty Surgeries, Baghdad, Al-Immam Ali Teaching Hospitals, Urology Consultation Clinic and Extracorporeal Shock Wave Lithotripsy Department in Bagdad City. A purposive "non-probability" sample of (100) patients with nephrolithiasis was selected out of these settings. The criteria, upon which the sample selection was employed, were included:

1. All patients who were diagnosed with nephrolithiasis (males and females).
2. Age of the patients who were diagnosed with nephrolithiasis was (18) years and older.

A questionnaire was designed and constructed by the researcher to measure the variables underlying the present study which was consisted of two parts:

Part I: Patients' Demographic Characteristics
Part II: Contributing factors to nephrolithiasis: This part was comprised of the followings:

Family History: This part of the questionnaire format was consisted of structured items which were concerned with family history of nephrolithiasis.

Lifestyle: This part consists of structured items which were concerned with patients' lifestyle. It comprised of (67) items. Items, which are related to diet, were (26) ones. They were rated as little (less than 3) times monthly, average (3-4) times weekly, frequent (4-7) times daily. It was adopted from the Institute of the Nutrition's Researcher/Baghdad and these include the nutritional materials which were found in Iraq. They were rated as 1 for little, 2 for average, and 3 for frequent. Concerning fluid intake, it was rated as never (1), sometimes (2), always (3). Limited activity rated on scale as (Yes, No) 2 for Yes, 1 for No. Medication intake was measured on scale of never, sometimes, and always and rated as 1 for never, 2 for sometimes, and 3 for Always.

Body Mass Index was calculated according to this formula:

$$BMI = \frac{\text{Body weigh t (KG)}}{\text{Height (M)}^2}$$ and classified as: {< 18.5 underweight /18.5 – 24.9 normal / 25.0 –

29.9/ overweight 30.0 – 39.9 obese/ > 40.0 extreme obesity} [10].

A cut-off-point for the past medical history and limited activity was used as follows:
Cut-off point = 15
Low score = 10 - < 12.5
Moderate score = 12.5- < 17.5
High score =17.5 – 20

Another cut-off point was used for the diet, water intake, beverage intake, and medication intake as follow:-
Cut-off point = 20
Low score = 10 – < 15
Moderate score = 15- < 25
High score = 25 - 30

Validity of the instrument was determined through the use of a panel of (12) expert who were from the field of the study to investigate its content clarity and adequacy in order to achieve the objectives of the present study.

Pilot Study:

A purposive sample of (10) patients with nephrolithiasis, which represented both sex, was selected from Al-kindey Teaching Hospital and Specialty Surgeries Teaching Hospital to determine reliability and clarity of the instrument and estimate the average time consumed to collect data for every subject . The pilot study was conducted from February 15th 2008 to March 3rd 2008. Internal consistency reliability was determined. The correlation coefficient for internal scales of the contributing risk factors was (r = 0.94) for the family history scale; (r=0.94) for the past medical history; (r=0.91) for the lifestyle scale (r=0.80); and for the medication scale (r=90) [9].

Results:

Table 1. Distribution of the study sample by socio-demographic characteristics

Gender	Frequency	Percent
78.0	78	Male
22.0	22	Female
100.0	100	Total
		Age
12.0	12	18 - 27
24.0	24	28 - 37
32.0	32	38 - 47
24.0	24	48 - 57
8.0	8	58 and more
100.0	100	Total
Marital status		
Married	83	83.0
Single	3	3.0
Divorced	2	2.0
Widowed	12	12.0
Total	100	100.0

Table 1. (Continued)

Education	Frequency	Percent
Illiterate	15	15.0
Read and write	19	19.0
Primary school	8	8.0
Secondary school	20	20.0
High school graduate	11	11.0
Institute graduate	19	19.0
College graduate and	8	8.0
Total	100	100.0
Occupation		
Employed	64	64.0
Government employed	25	18.2
Self-employed	39	29.9
Total	64	64.0
Unemployed	36	36.0
Housewife	19	19.0
Retired	16	16.0
Students	1	1.0
Total	36	36.0
Hot Climate		
Yes	52	52.0
No	48	48.0
Total	100	100.0
Residential area		
Baghdad and Al-Furat	85	85.0
South area	15	15.0
Total	100	100.0
Body Mass Index		
18.5 ≥	29	29.0
25 – 29.9	54	54.0
30 – 30.9	16	16.0
40 and more	1	1.0
Total	100	100.0
Family History		
Yes	43	43.0
No	57	57.0
Total	100.	100.0

Table (1) shows that the majority of the sample (78%) was male and (32%) was at age of (38-47) years old. The majority of the sample (83%) was married. One fifth of them (20%) was secondary school graduate and (64%) was employed, (29.9%) was self-employed. Almost half of them was exposed to hot environment. The majority of the study sample (85%) lives in Baghdad and Mid-Furat area. More than half of the study sample (54%) had a body mass index of 29.9 and

most their families (57) has no history of nephrolithiasis.

Table 2. Distribution of the rating of score for the study sample's past history, diet, water intake, beverage intake, movement, and medication intake

List	Rating of score	Frequency	Percent
1	**Past history**		
	Yes	38	38.0
	No	62	62.0
	Total	100	100.0
2	**Diet**		
	Yes	27	27.0
	No	73	73.0
	Total	100	100.0
3	**Water intake**		
	Yes	86	86.0
	No	14	14.0
	Total	100	100.0
4	**Beverage intake**		
	Yes	18	18.0
	No	82	82.0
	Total	100	100.0
5	**Movement**		
	Always	9	9.0
	Sometime	83	83.0
	Never	8	8.0
	Total	100	100.0
6	**Medication**		
	Yes	63	63.0
	No	37	37.0
	Total	100	100.0

This table depicts that high rating of score is related to past medical history (2) which is accounted for (62%); high rating of score is related to diet (2) which is accounted for (73%); high rating of score is related to water intake (1) accounted for (86%); high rating of score is related to beverage intake (2) which is accounted for (82%); high rating of score is related to movement (2) which is accounted for (83%) and that of medication (2) which is accounted for (63%).

Table 3. Association between nephrolithiasis and the sample's socio-demographic characteristics

	Age	Gender	Marital Status	Education	Occupation	Work Environment	Setting	Body Mass Index	Family History
χ 2 Obs.	19.20	31.6	27.72	18.48	7.840	7.64	60.50	51.38	15.38
D F	4	1	6	3	1	1	3	2	2
χ 2 crit.	11.67	3.84	12.59	7.82	3.84	3.84	7.82	5.99	5.99

Table (3) presents that there is a significant association between these variables and nephrolithiasis.

Table 4. Association between the patients' past medical history and nephrolithiasis

Rating of score of past medical history	Observed Number	Expected Number	Residual
Yes	38	30.0	7.2
No	62	30.0	24.2
Total	100	30.0	
χ 2 Obs.=25.32	df= 1	χ2 Crit.= 3.84	P < 0.05

df= Degree of freedom; P=Probability Level; χ2crit.= Critical Chi-square; χ2 Obs.= Observed Chi-square

This table shows that there is a significant association between past medical history and nephrolithiasis.

Table 5. Association between the patient' water intake and nephrolithiasis

Rating of score for water intake	Observed Number	Expected Number	Residual
Yes	85	50.0	3.0
No	14	50.0	3,0
Total	100	100.0	
χ2 Obs.= 51.840	df=1	χ2 Crit.= 3.84	P <0.05

df= Degree of freedom; P=Probability Level; χ2crit.= Critical Chi-square; χ2 Obs.= Observed Chi-square

This table reveals that there is a significant association between water intake and nephrolithiasis.

Table 6. Association between patients' diet and nephrolithiasis

Rating of score for diet	Observed Number	Expected Number	Residual
Yes	27	50.0	0
No	73	50.0	0
Total	100		
χ2 Obs. = 40.04	df = 1	χ2 Crit.= 3.84	P<0.05

df= Degree of freedom; P=Probability Level; χ2crit.= Critical Chi-square; χ2 Obs.= Observed Chi-square

This table indicates that there is a significant association between diet and nephrolithiasis.

Table 7. Association between patients' beverage intake and nephrolithiasis

Rating of score for beverage intake	Observed Number	Expected Number	Residual
Yes	18	50.0	45.3
No	82	50.0	52.2
Total	100		
χ2 Obs. = 40.960	df = 1	χ2 Crit. = 3.84	P< 0.05

Table (7) shows a significant association between beverage intake and nephrolithiasis.

Table 8. Association between patients' limited activity and nephrolithiasis

Rating of the score for limited activity	Observed Number	Expected Number	Residual
Always	9	33.3	24.3
Sometime	83	33.3	49.7
Never	8	33.3	25.3
Total	100		
χ2 Obs. = 111.02	df = 2	χ2 crit.= 5.99	P< 0.05

df= Degree of freedom; P=Probability Level; χ2crit.= Critical Chi-square; χ2 Obs.= Observed Chi-square

This table indicates that there is a significant association between limited activity and nephrolithiasis.

Table 9. Association between patients' medication intake and nephrolithiasis

Rating of score for medication intake	Observed N.umber	Expected Number	Residual
Yes	63	50.0	13.0
No	37	50.0	13.0
Total	100		
χ2 Obs. = 6.76	df = 1	χ2 Crit.= 3.84	P< 0.05

df= Degree of freedom; P=Probability Level; χ2crit.= Critical Chi-square; χ2 Obs.= Observed Chi-square

The table depicts that there is a significant association between medication intake and nephrolithiasis.

Discussion:

Part I: Discussion of the patients' socio-demographic characteristics

The findings indicate that the majority of the study sample (78%) is males.

This result was similar to that nephrolithiasis affects about (12%) of men and (5%) of women [10, 11]. The findings also show that the high percent of nephrolithiasis patients is at age (38–47) years**.** This finding is supported by a study which stated that nephrolithiasis is more common in persons especially those ages (30-45) year old [12, 13]. Concerning marital status, the findings indicated that the majority (83%) of the study sample was married. This finding agrees with that married exposed to infection more than non married and this leads to nephrolithiasis [14].

Relative to their education, the findings reveal that most of the study sample (20%) is secondary school graduate.

Regarding to hot environment, the findings show that (52%) of the study sample are exposed to hot environment. This finding is supported by a study which stated that stone disease in U.S shows marked geographic variability; the southeast has been found to have as much as a (50%) higher prevalence of stone disease than North West [15]. Furthermore, hot environment causes more sweating and excessive lose of fluids which increase the probability of dehydration and lead to stone formation.

With respect to their occupational status, the findings indicate that (64%) of the study sample was employed; (60.9%) of them has free job, (34%) hold administrative job and (4.7%) has health job. Findings also indicate that (36%) of the study sample is unemployed; (52.8%) of them is housewife, (44.4%) is retired and (2.8%) is students. This finding has disagreed with that the physicians and other white-collar workers have an increased incidence of stone compared with normal labor [16].

Relative to their residential area, the present study indicated that the majority (85%) of the study sample lives in Baghdad and middle area and (15%) lives in southern area. We can explain that the patients who attend hospitals in Baghdad are from people who live around and near to these hospitals due to the unstable security situation.

Relative to their body mass index, the findings showed that (54%) of the study sample is at range of (25–29.9) what means that they were overweight. This finding is supported by a study which stated that obesity and higher body mass index and large waist measurements were both identified as a risk factors for nephrolithiasis [17, 19].

Concerning family history, findings show that (52%) of the study sample has family history of nephrolithiasis. It is supported by a study which stated that people with family history of kidney stone at higher risk than those without relative with stone. [18]. It is reported that kidney stone patients (22%) of their parents and (14%) of their siblings also had one [20].

It is indicated that (86%) of the study sample has shortage in drinking water. This result is supported by a study which stated that drinking (8–10) glasses of water a day is the best way to prevent stones formation [21]. There is another agreement with this finding that drinking water increases the volume of urine. In the process, substances which form kidney stones are diluted, reducing the risk that they will form into a stone. For this reason, people with a history of kidney stones should drink plenty of water—often two quarts per day. It's particularly important for people in hot climates to increase their fluid intake to help prevent kidney stones [22].

Part II: **Discussion of the effect of the contributing risk factors to nephrolithiasis**

This table indicated that there was a significant association between past medical history and nephrolithiasis. This finding is supported by a study which explained that hypertensive people are up to three times more likely to develop kidney stone [23].

The findings have indicated that there is a highly significant association between drinking beverage and nephrolithiasis. Cola consumption has significantly increased urinary calcium and oxalate excretion, patients who avoid colas and other phosphoric acid–containing beverages have been found to have a 15% lower rate of stone recurrence than those who continue to consume these beverages, the association of coffee and tea intake with risk for stone formation appears to be less controversial, with findings of an inverse association with risk, overall fluid consumption appears to be most important [24].

It is found that there is a significant association between diet and nephrolithiasis. This finding is in an agreement with that certain foods increase the risk of kidney stone only in people who have genetic or medical susceptibility [25].

It is indicated that there is association between limited physical activity and nephrolithiasis. This finding is supported by a study which stated that more physical activity and exercise will help to hydrate more and it will help any crystal formation to move and flush out of the body [26].

Data analysis presents that there was a significant association between medication intake and nephrolithiasis. This result agrees with that patients are at high risk for stone, mainly because of medication [27].

Conclusion:

According to the findings and their discussion, the study can conclude that: the majority of the study sample is male; most of them is (38-47) years old. The majority of them is married, most of them is employed, secondary school graduate, living in Baghdad, and have had lack in drinking water, most of the sample had family history of nephrolithiasis. It is also concluded that there is a significant association between family history, water and beverage intake, limited activity, medication intake and nephrolithiasis, and there is an effect from dietary status on nephrolithiasis**.**

Recommendations:

Based on the study results, it can be recommended that increase fluid intake, especially water could prevent recurrent stones and new stone formation, high fiber low (protein, salt, fat) diet and decrease in beverage intake (i.e., soft drink, tea, and coffee) and increase in activity and exercise.

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